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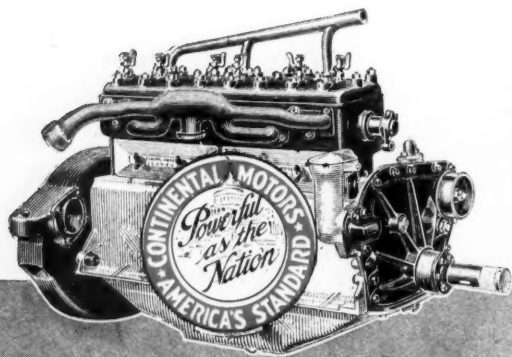
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AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, NOVEMBER 9, 1922

No. 19

Trend Toward Smaller Models Feature of British Show

Noticeable increase in number of models and in four-cylinder engines of less than 120 cu. in. displacement. One maker has twelve chassis types and fifty-five optional body models. Low attendance on first two days. Little actual business reported.

By M. W. Bourdon

LONDON, Nov. 3 (By cable).

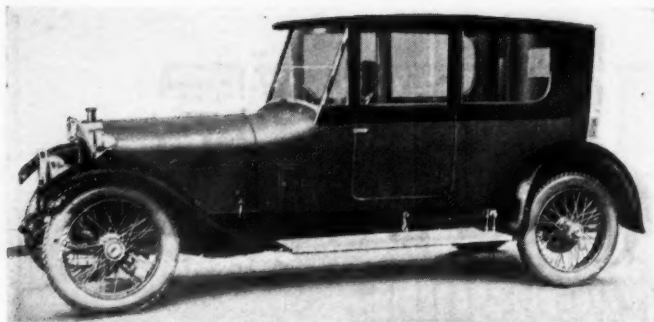
THE outstanding feature of the Sixteenth Annual London Motor Car Show, which was opened to the public yesterday, is the record number of new models with four-cylinder engines under 120 cu. in. displacement, with four-passenger bodies, and a selling price between £250 and £400. These represent a continued endeavor to secure lower operating costs through the reduction of engine size together with higher engine efficiency. While the general trend, as last year, continues towards smaller engines, there also exists a tendency to increase the engine dimensions of four-passenger light cars.

Other features observable include the following:

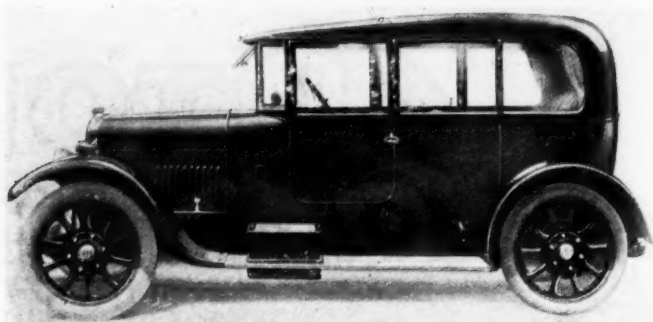
1. A number of makers hitherto specializing on large cars who are introducing smaller models.
2. A marked increase in the number of overhead valve engines, all those of British manufacture having push rod valve actuation.
3. A number of new small six-cylinder models of 80 to 200 cu. in. piston displacement.
4. The reluctance shown by British makers to adopt front wheel brakes; although Austin has them on a miniature "7" described in AUTOMOTIVE INDUSTRIES earlier this year and Sunbeam offers them on its six "24" at an extra charge of £125, no other maker shows them or will fit them.

New British designs generally bear evidence that more consideration has been given to production costs without, however, lowering the standard of body work, of finish or quality of the accessories. In response to a buyers' demand for better weather protection, framed, detachable side panels for open cars are now almost universally supplied. Some of these side panels have elaborate framing and attachments. On one car the panels are made of glass while on all others they are of celluloid.

IN the majority of cases these side panels must add appreciably to the manufacturing costs. Many are usable when the top is folded, the rear panels then forming a V fronted shield for the rear passengers. Most makers are standardizing folding top sedans and some the fixed type of sedan. Even for light cars these closed bodies are offered at prices which usually range more than £100 above those of the open type, but the latter still form about 95 per cent of the total output. One fixed top sedan for light cars has a shell body, steel tube framing, all seats detachable, a central sliding door with frameless drop windows and no double paneling. This design has good possibilities as a light weight low-priced job.



Sloping front sedan on a 40-50 hp. Napier exhibited by a body builder at Olympia



Arrol Johnston sedan with V-front screen; has rear door on right hand side and sliding and tip-up front seats

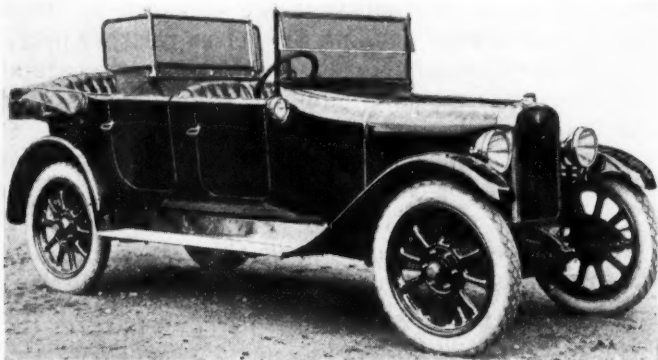
The extensions to Olympia not being completed, the show is again divided between that building and the White City, a single admission fee being charged and free transportation furnished. Accessories, tires and cars of all sizes and nationalities are exhibited at both sections of the show.

THE public again gives preference to Olympia, however, placing exhibitors at the White City under a disadvantage. Thirty of these latter exhibitors, including Dodge, Hupp and Paige, issued a combined appeal asking the press to emphasize the equal importance of their section of the show.

Besides forty-three British makes there are six French, five American (Case, King, Moon, Durant and Packard), four Italian and one Belgian makes on exhibit at the White City. The more fortunate American makes to whom the ballot gave space at Olympia include Buick, Chevrolet, Oakland, Cadillac, Chandler, Cleveland, Gardner, Essex, Hudson and Overland. The show is thoroughly international, except for the fact that the ban on late enemy productions is continued and that there are no representatives of the Dutch and Swiss industries.

Increase in Number of Exhibitors

A total of 159 different makes of cars are being shown, which is an increase of four over last year. This list comprises ninety-six British, twenty-four French, eighteen American, eight Italian and three Belgian



Austin Twelve with standard four-passenger body and normal screen equipment

names. Including the accessory exhibits there is a total of 555 stands, as compared with 520 at last year's show. On 288 stands, including fifty-one of body builders, there are exhibited 758 cars, an increase of seventy-eight over last year's show. This increase has been made possible more by the reduction in the average size of car than by any increase in the floor space. The total includes 109 bare chassis, the majority of them highly finished.

On Friday and on Saturday morning the attendance was materially below that of the opening days last year. No official figures are as yet available, but it is estimated that the reduction in attendance was from 30 to 40 per cent, which is ascribed in part to the imminence of the parliamentary elections. There was no overcrowding until the arrival of the usual Saturday afternoon sight-seers, who entered at the reduced admission fee of 1 shilling. Exhibitors, with few exceptions, report the business done so far to be disappointing.

The most popular type of car for 1923 will be a four-cylinder four-passenger model of 90-120 cu. in. piston displacement, selling at between £300 and £400. The corresponding six-cylinder cars are mostly new models and are not attracting much attention, buyers willing to pay the price usually asked for these models, usually preferring the bigger fours. There is a fair demand for two-passenger fours at from £200 to £250. It is still too early to fully judge the 1923 prospects, the only certainty being that there will be unprecedented competition in nearly every field.

The president of the Society of Motor Manufacturers and Trades at the inaugural function was guardedly optimistic, but deplored the difficulty in connection with export business while the present British motor taxation system continued. He asserted that this system, which penalizes large bore, moderate speed engines, encourages a home demand for car types that are not popular overseas. The result is that output is restricted, which necessitates comparatively high prices.

Prices generally show a considerable reduction, although the drop is less on a percentage basis than at the 1921 show. The largest proportional price reductions since last year is shown by the American cars, averaging 20 per cent; the Continental reductions average 12 per cent, as compared with 23 per cent last year, and British reductions 15 per cent as compared with 17 per cent last year. The largest British reductions are on light cars and average 20 per cent.

Price Reductions General

Morris, who now has the largest output of any British maker, and is planning a production of 15,000 cars for next year, caused a stir just before the show by announcing a second cut within six weeks, the two cuts combined amounting to 24 per cent. He now offers a four-passenger "twelve" of 102 in. wheelbase at £255, a figure which is unapproached by any other British make of similar specifications. The largest actual reduction since the last show is on the Napier six, from £2,100 to £1,750, while the biggest single cut occurred on the Vauxhall "twenty-three," from £1,150 to £895. The Rolls-Royce "fifty" chassis at £1,850, the Austin "twenty," five-passenger model, at £695, and the two

Daimlers are the only British cars that are not reduced in price. The Cubitt "sixteen," of 170 cu. in. piston displacement, again stands alone on a price basis among full sized British five-passenger cars, having reduced 24 per cent. It now sells at £360. This compares with the Essex at £490, Maxwell at £360 and Dodge at £350, which latter cars carry a 30 per cent import duty. Cubitt's nearest British competitor sells at £475, but this type is not so popular as the smaller fours of even the same or a greater price. Only four British makers, including Napier and Lanchester, are now specializing on the luxury type. Rolls-Royce is not showing the new "twenty," fearing that the stand would be monopolized by curiosity seekers who would crowd off legitimate prospects for both the "fifty" and "twenty."

More Chassis Types Offered

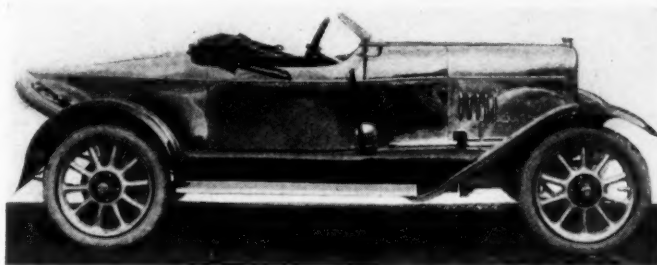
British makers with few exceptions are increasing the number of their chassis models and body types, often in an endeavor to broaden their appeal in every direction. Daimlers are a conspicuous example. They are introducing two small sizes, one of 87 cu. in. capacity and selling at £550 for the chassis, the other of 132 cu. in. capacity and selling at £625, both with four speed gearsets amidships, following the practice of the three larger existing six-cylinder models. In addition they are making the 87 cu. in. six with a three-speed unit power plant at £450 for the chassis, and also a new four of the same dimensions as the 132 cu. in. six at £325 for the chassis, and a two-cylinder air-cooled "ten" at £230 for the complete car with two-passenger body. All except the last-mentioned models have Knight engines. On some models two chassis lengths are being offered. This results in a total of twelve types with fifty-five optional bodies.

Wolseley furnishes another prominent example of this tendency, adding a four-cylinder fourteen to a range already comprising five distinct chassis from a two-cylinder "seven" to a six-cylinder "twenty-four," with optional chassis dimensions in several cases. The new "fourteen" with side valves is a lower priced edition of the existing overhead camshaft model, and sells at £525 as compared with £660, both being four-passenger cars. Many other instances of the same policy could be mentioned, some firms adding both larger and smaller models. The tendency observable immediately after the war to concentrate on one model has been completely abandoned and the other extreme adopted. Many additional models have parts interchangeable with existing types. Sometimes the gearset, axles and steering gears

are identical with those of earlier models, whereas the multiple model policy previous to the war usually inferred differences throughout the chassis.

The show is remarkably free from unorthodox designs. The new Lancia is here but there is nothing unusually deserving mention among British productions. The following percentages apply to individual models of all nationalities exhibited. Disregarding two-cylinder models, which show no increase in number or popularity, fours constitute 75 per cent, sixes 19 per cent, eights 5 per cent and twelves 1 per cent of the total, all of these figures being practically the same as last year.

Detachable heads are found on 65 per cent of the models, a gain of 7 per cent. While the use of side valves

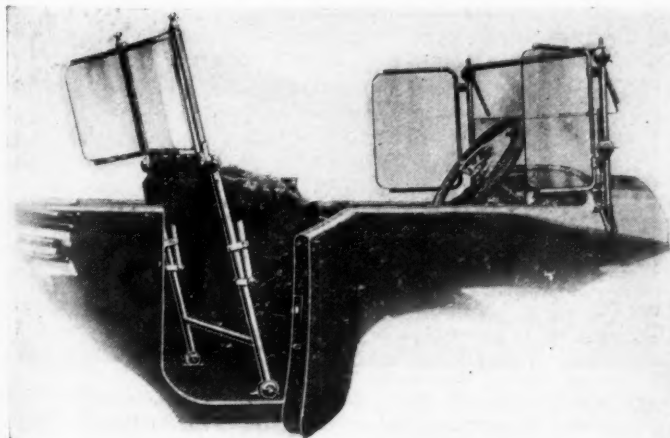


Popular type of "sport" body on Alvis Twelve. All aluminum panels, pointed tail curtains, single dickey seat. Engine has thermostatic control for thermosyphon water circulation

decreased from 64 to 57 per cent, overhead valves with pushrods increased from 17 to 24 per cent, and overhead camshafts dropped from 12 to 10 per cent. Models with sleeve valve engines increased from 7 to 9 per cent. Pressure lubrication has fallen from 61 to 49 per cent, while the splash-pressure system increased from 16 to 31 per cent, and the simple splash system dropped from 23 to 20 per cent.

Magneto ignition shows a slight decline, from 87 to 84 per cent. Gravity fuel feed increased from 35 to 44 per cent, vacuum feed dropped from 58 to 44 per cent, and pressure fuel feed advanced from 7 to 12 per cent. Aluminum pistons are now used on 48 per cent of the models as compared with 34 per cent last year. Pump circulation is found on 54 per cent of the cars, a drop of 4 per cent. Water temperature control increased from 5 to 9 per cent.

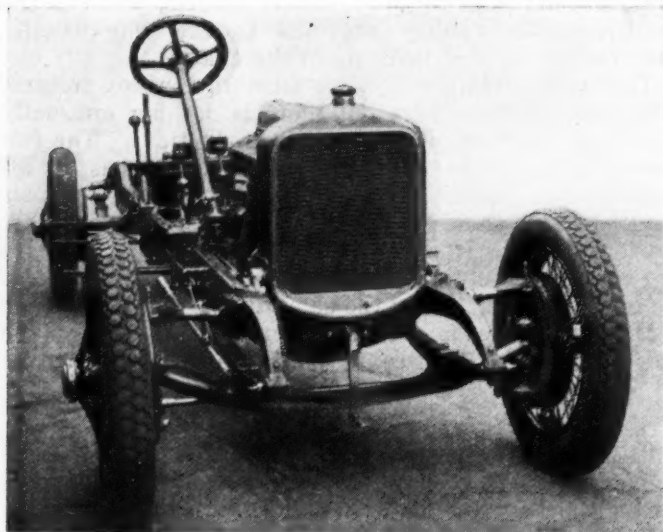
Cone clutches decreased from 46 to 44 per cent, single plate increased from 31 to 34 per cent, while the multi-plate type in both the dry and oil operated variety re-



Screen equipment of new Ruston Hornsby car



Upholstered pocket behind driving seat is provided on Sunbeam cars for the detachable framed side panels for use with the folding top



Front view of Sunbeam 24 six with which front brakes are optional at extra cost of £125. Note round section of front axles outside springs to resist braking torque

tained practically the same standing, viz., 14 and 8 per cent. Four speed gear boxes increased from 51 to 55 per cent. Open propeller shafts remain the same at 47 per cent, spiral bevels increased from 67 to 83 per cent, while straight bevels dropped from 20 to 6 per cent, and the worm from 13 to 11 per cent. The practice of placing all brakes on the rear wheels increased from 51 to 60 per cent, while the practice of mounting the brakes on the wheels and the transmission has fallen from 39 to 20 per cent and four-wheel brakes gained from 10 to 14 per cent. Carrying brakes on both the front and rear wheels and also on the transmission appeared for the first time, being represented on 4 per cent of the models, while on 2 per cent there were brakes on the front wheels and on the transmission. Cantilever springs dropped from 24 to 20 per cent and half-elliptic from 59 to 55 per cent, while quarter-elliptics increased from 12 to 19 per cent and three-quarter-elliptics from 5 to 6 per cent. The number of new models of all nationalities exhibited was eighty-five, but of these about 50 per cent are not yet in production.

Considering British cars only, there is little change with respect to practice as regards cylinder numbers, the sixes having increased from 13 to 15 per cent and the fours dropped from 77 to 75 per cent, as compared with last year. Overhead valves show an increase of 24 to 33 per cent, including three models having overhead inlet valves only. Of the engines with overhead valves 74 per cent employ long tappet rods, as compared with 56 per cent last year and 43 the year previously. Helical gear drive for the camshaft in the crankcase increased from 22 to 28 per cent, some makers having experienced trouble with chains, which was generally due either to the use of too small a size or to incorrect application. Of the sixes 48 per cent have block cast cylinders as compared with 10 per cent last year, this being largely accounted for by the increase in small sixes.

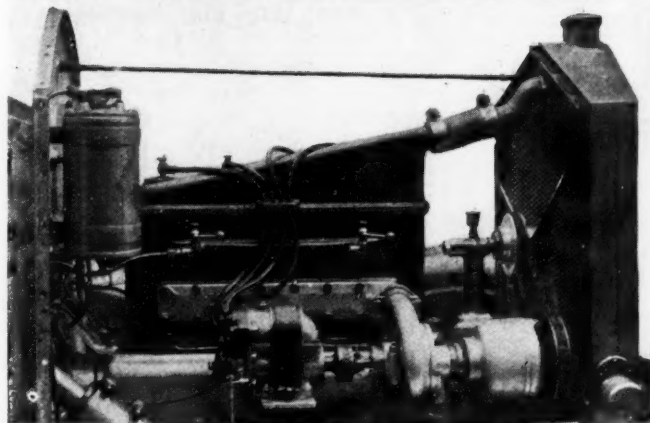
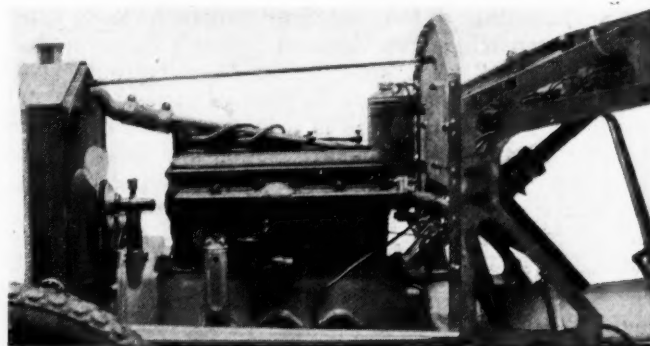
Air-Cooling in Development Stage

Air cooling has not made its appearance on British fours and sixes, but developments in this direction are expected before the 1923 show opens. Oil cooling is now used by two "twos" and one "four," although the latter is not exhibited. Pump water circulation decreased from 49 to 42 per cent. Cooling control, which was used on three cars only last year, is now seen on thirteen,

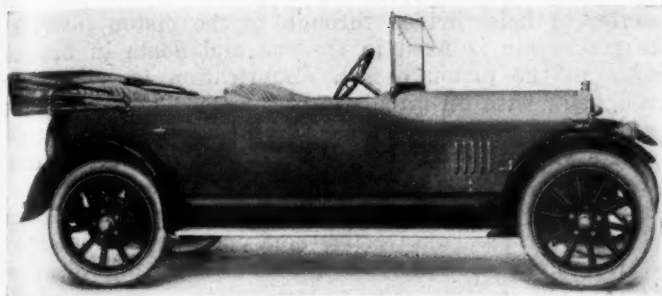
including two 100 cu. in. "fours," with thermo-siphon circulation. Cellular radiators constitute 75 per cent of the total. Solid white metal casings increased from 30 to 64 per cent, nicked brass, represented on 32 per cent, lost proportionately, while an aluminum shell is used on one make only. Three cars have a separate radiator shell. Pressure lubrication dropped from 54 to 44 per cent, splash showing an increase of from 21 to 34 per cent, while the full pressure system is used on four cars only. Aluminum pistons increased from 33 to 41 per cent, magneto ignition decreased from 94 to 88 per cent, while battery ignition increased from 6 to 12 per cent. However, several makers are using a magneto after first announcing battery ignition for new models, fearing the prejudice of dealers, who find that a magneto never prevents a sale but a battery does occasionally.

Straight Side Tires Gain in Favor

Vaporization is given more attention but the various systems are quite orthodox. Cone clutches still predominate, but the single plate type increased from 33 to 36 per cent. Unit power plants increased from 27 to 48 per cent. Four speed gearsets increased from 42 to 46 per cent, despite the number of new small cars. Worm drive gained 1 per cent, and spiral bevel drive now stands at 76 per cent. Half-elliptic front and rear springs stand at 43 per cent, the same as in 1921. Quarter-elliptic springs at both ends increased from 20 to 25 per cent, cantilever rear springs dropped from 22 to 15 per cent. Disk wheels dropped from 29 to 27 per cent, pressed steel, hollow spoked wheels increased from 48 to 56 per cent, and wire wheels retained their position with 15 per cent, while the wood wheel is now almost defunct. Straight side tires are beginning to gain favor, being now standard equipment on 6 per cent of British



Two views of Burt & McCollum single sleeve valve engine of British car with Entz magnetic transmission system. Latter is also used on another British production, the Ensign, with an overhead camshaft six-cylinder engine. Engine illustrated is $3\frac{1}{2} \times 5\frac{1}{2}$ in. and four-passenger car sells at £950



New Wolseley Fourteen four-passenger car, chassis of which, excepting engine, follows lines of 15-hp. model. Complete car sells at £525

cars, as compared with 1 per cent last year. The new adherents of this type of tire include such extremes as the Rolls-Royce on the one hand and the Singer, one of the popular British light cars, on the other.

Internal brakes on the rear wheels only increased from 67 to 77 per cent, the remainder of the models having the brakes divided between the wheels and the transmission. Front-wheel brakes are practically non-existent on British cars. Five cars only have external rear brakes. Brake linkage by cables has made still further gains in popularity, the brakes being usually equalized by the cable passing through a transverse shaft which carries curved and grooved end levers. The use of aluminum for axle housing has perceptibly increased. When the aluminum extends beyond the central casing, steel tube liners are almost invariably used, though there are two semi-floating all aluminum axles, one being a double banjo pattern. Double banjo pressed steel axles are fitted on 16 per cent of the British cars.

A classification of 54 new British models gives the following percentages: Four-cylinders, under 60 cu. in. displacement, 2; 60-70 cu. in., 10; 70-90 cu. in., 7; 90-100 cu. in., 6; 100-120 cu. in., 13; 120-150 cu. in., 2; 150-200 cu. in., 2; over 200 cu. in., 3. Six cylinders, 80-90 cu. in., 1; 90-100 cu. in., 2; 100-150 cu. in., 3; 150-200 cu. in., 3. Features of these fifty-four new cars are as follows: Side valves, 25; overhead or push rods, 24; sleeve valve, 5; aluminum pistons, 24; pressure lubrication, 22; gear drive for camshaft, 28; magneto, 44; cone clutch, 33; four speeds, 24 (nine of the latter under 100 cu. in. displacement).

Grease gun chassis lubrication and leather spring covers are now items of standard equipment on 25 per cent of all British cars. Rear trunk carriers are found on 15 per cent of all four passenger models and rear folding windshields on six makes. The provision for storing frame side panels on open cars usually comprises a compartment behind the back upholstery hinged at the bottom of the front or rear seat. Other plans include a pocket behind the front seat panel, large door pockets and a drawer under the rear seat. The body types on several makes of light cars with from 60 to 70 cu. in. piston displacement are miniatures of the close coupled four-passenger type, the rear seat having restricted leg room and only accommodating two children or one adult sitting slantwise.

Morris Adds Two New Models

Morris is the only maker of assembled cars worthy of mention, and even his power plants are of his own design, though made at the Hotchkiss English plant at Coventry, which works exclusively for him. Morris is adding two new models, one with a larger four-cylinder engine but otherwise identical with an existing chassis, the respective piston displacements being 94 and 112

cu. in. The other is a six-cylinder model of 141 cu. in. with the same cylinder dimensions as the small four viz., 69 x 102 mm., and the same gearset. All models have three speeds and five-plate clutches with cork inserts. Only the six is furnished in a folding top sedan model, at £575. The new four sells at £380 with a four-passenger body. With optional finish and equipment the small four sells at between £255 and £355.

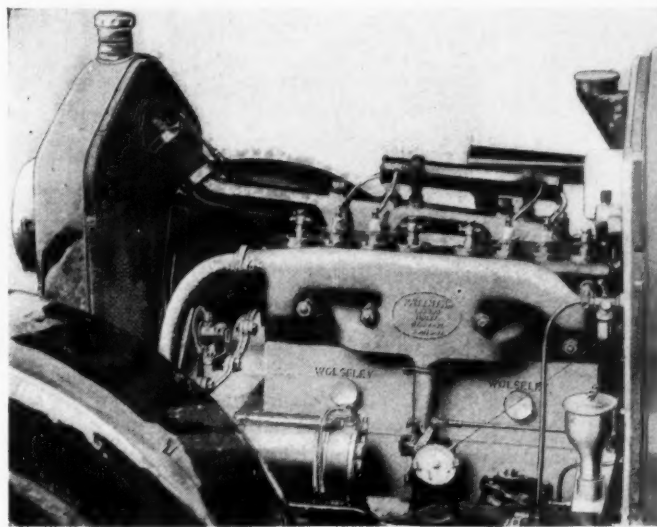
Humbers have adopted new overhead inlet valve engines for their 106 and 170 cu. in. displacement fours and also for the new 60 cu. in. four, claiming running and production advantages as compared with all overhead valves. The new small four is a high grade job and with the close-coupled body sells at £275. The four-passenger 106 cu. in. sells at £525. The five-passenger 170 cu. in., termed a "sixteen" and claimed to develop 50 hp., sells at £750. The Austin four-cylinder "Twelve" of 100 cu. in. piston displacement appears at this show for the first time and sells at £450. It is a four-passenger model and is equipped with a four-speed gearset. This and the Austin "twenty" are now equipped with two spare wheels and tires.

The Standard company exhibits a 56 x 110 mm. eight-cylinder V engine which is so designed that it is interchangeable with a 117 cu. in. displacement four-cylinder engine in the normal "twelve" chassis. Vauxhall has adopted the overhead pushrod engine for a "four-30" design similar to the new "twenty-three" recently described in AUTOMOTIVE INDUSTRIES.

Two British cars are now fitted with the Entz transmission. One has an 80 x 130 mm. four-cylinder single sleeve valve engine and sells at £750 for the chassis, while the other has an overhead camshaft, 102 x 140 mm. engine, which has formerly been used by the same concern (Ensign) with an ordinary transmission. The price is now £1500 for the chassis.

Wolseley

Operating in one of the largest of British automobile plants, the Wolseley Co. has added still further to its range of chassis and body types, increasing the former from five to six. Actually, however, from a production standpoint, the chassis types exceed six in number, for with variations in number of gears, wheelbase and track, and "sporting" models of three sizes, there are eleven chassis from which potential buyers may make a selection; and for these eleven chassis there are 36 different

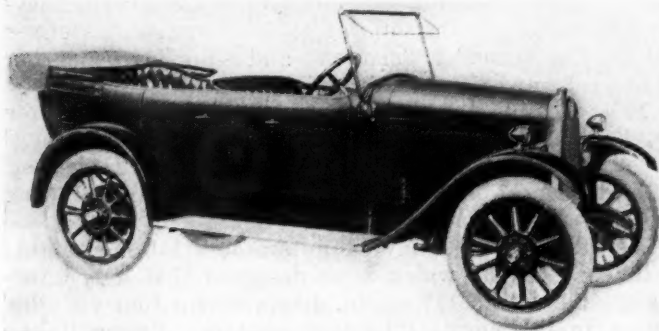


Left side of engine of new Wolseley Fourteen, which has pair-cast cylinders and a bore and stroke of 3 1/8 x 5 1/8 in.; note integral and exhaust manifolds with front outlet pipe to muffler

bodies available, with 41 different list prices according to optional equipment selected.

The six leading models are the 7-hp., two-cylinder; 10-hp., 14-hp. and 15-hp. fours, and the 20-hp and 24-hp. sixes. Of these the new one is the 14-hp., which has an integral L-head engine with pair-cast cylinders. Its dimensions are $3\frac{1}{8} \times 5\frac{1}{8}$ in., in which it is identical with the 15-hp., but the latter has block cylinders and an overhead camshaft. The cylinders are the counterpart of those of the 20-hp. Six, and so also are many other engine details.

This new model has been introduced to cope with a demand for what is being termed a "family" car; it has



New 12-14 hp. Crossley four-passenger which is designed to sell at popular price on British standards, viz., £475

larger engine and chassis dimensions than the biggest of the overgrown light cars, but a somewhat lower efficiency and maximum speed than the latter; it is a more "sedate" type, able to maintain its original standard of efficiency with less attention than the high-speed high-efficiency models of similar size, and selling at a lower price with a roomy and comfortable four-passenger body. Thus we have the 15-hp. Wolseley, with its high-efficiency engine, selling at £660, while the 14-hp. is £525; behind the clutch the two chassis are identical and the price difference is due to the simpler engine design and the less elaborate equipment and finish of chassis and body.

Some details of the specifications are as follows: The crankshaft has three white metal bearings, the camshaft three of bronze. Aluminum pistons are used, with straight sides and three compression rings, the lower of which

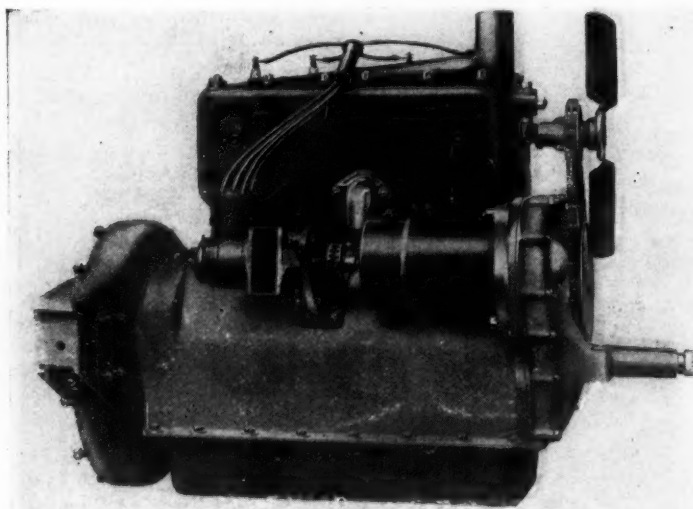
serves also as a scraper, having its groove beveled off with a series of holes drilled through to the piston interior. The piston pin is fixed in the rod and floats in bronze bushes in the piston bosses. Lubrication is by splash throughout, with oil circulation by a gear type pump at the side of the camshaft with a filter incorporated. Three separate silent chains are used for the distribution, one each for the camshaft, generator and the water pump and magneto driven in tandem. The valves are inclined at a slight angle from the vertical and operate in renewable cast iron guides. The inlet and exhaust manifolds are integral, with a wide contact between them immediately over the vertical pipe from the carburetor flange. The exhaust pipe to the muffler is led away to the front. Fuel feed to the Wolseley carburetor is by gravity, the tank filling spout being under the hood.

The clutch differs from that of all other Wolseleys, except the smallest, in being of the inverted, fabric faced cone variety, with two roller races for the pilot; the driven member is of pressed steel and the driving unit of cast iron and bolted to the rear face of the flywheel. The three-speed gearset with side control is separately mounted on the main frame, while the propeller shaft is of the semi-enclosed type, a short coupling shaft from the gearset, with a fabric joint at the front and a sliding pot joint behind, connecting to the propeller shaft proper in its torque tube. Final drive is by bottom worm of 5.2 to 1 ratio.

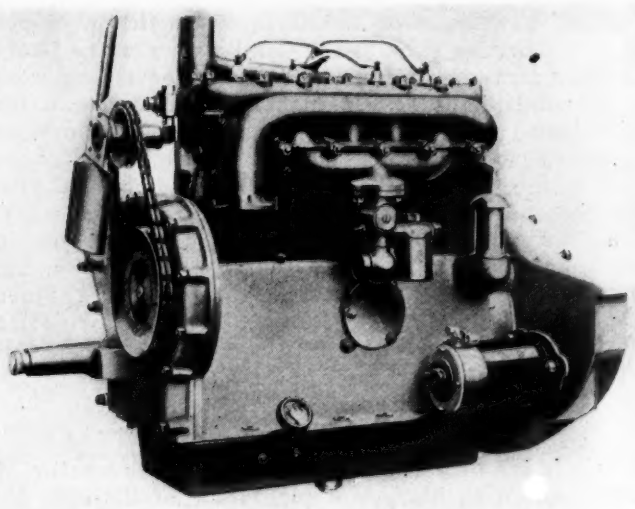
Brakes are all within the rear wheel drums, and consist of four segmental shoes in the same plane in each drum, two operated by pedal and two by lever. Quarter elliptic springs are used back and front, the front ones having a short "safety" leaf. Timken roller bearings are fitted throughout the transmission, except for the gearset pilot, which is a plain bronze bushing. Pressed-steel hollow-spoked wheels are standard, as are 32 x 4 in. Dunlop tires with clincher edges.

Wolseley Prices Compared

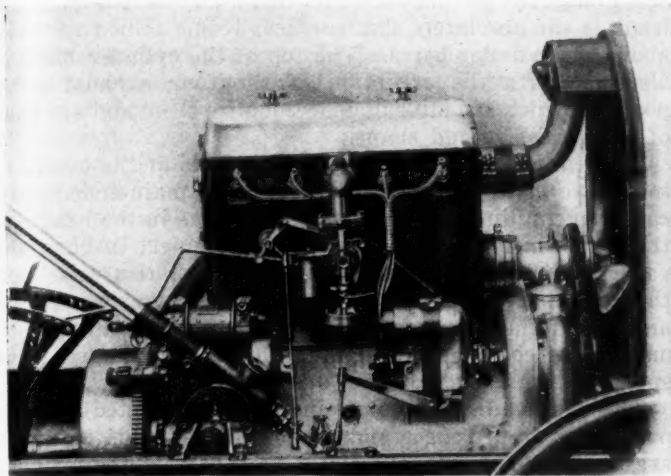
The standard body is a three-door, four-passenger, open type with fabric top and detachable side panels, provision for storing the latter out of use being in the form of a compartment disclosed by pulling forward the top of the back seat upholstery. The wheelbase is 118 in., the track 52 in., and the ground clearance 8 in. The chassis alone weighs 1750 lb. and the complete car 2800 lb. For the chassis without body-work, but including the electric



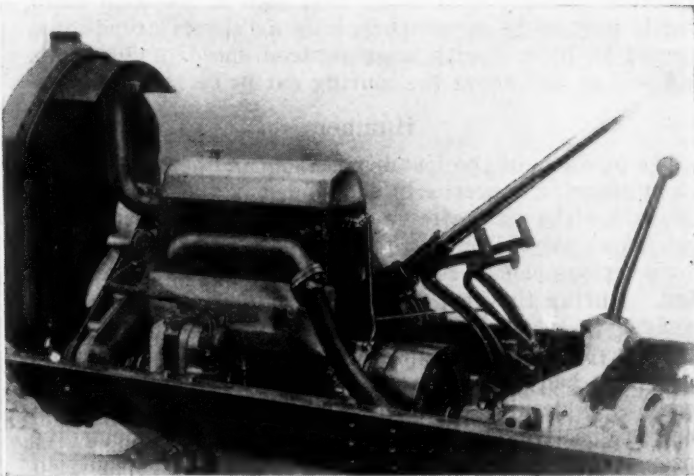
Right side of new 12-14 hp. Crossley engine showing barrel type crankcase with rear end cover integral with clutch housing and bearer arms. Magneto is of new M-L type with separate skew gear driven distributor.



Left side of new 12-14 hp. Crossley engine which has bore and stroke of 80 x 120 mm.



Right side of new 15.9 hp. Humber engine which has overhead inlet valves and side exhaust



Powerplant of new 11.6 hp. Humber engine which, like all models of this make, now has overhead inlets and side exhaust valves

equipment, £450 is charged. As showing where the extra price of the 15-hp. overhead camshaft model comes in, it is of interest to note that the chassis only of the latter is £500; thus in the body and equipment there is £85 of the extra £135 for the complete car and £50 for the difference in the two engines.

Following is a comparison of prices of the Wolseley models, with standard body-work and equipment, with the 1922 figures in parentheses: 7-hp. two-cylinder, 82 x 92 mm., two-passenger, £255 (£310); 10-hp. four-cylinder, 65 x 95 mm., two-passenger, £380 (£475); 15-hp. four-cylinder, 80 x 130 mm., four-passenger, £660 (£975); 20-hp. six-cylinder, 80 x 130 mm., five-passenger, £995 (£1,200); 24-hp. six-cylinder, 90 x 140 mm., five-passenger, £1,145 (£1,350).

Crossley

Another prominent British firm, Crossley Motors, Ltd., has adopted the same policy as Wolseley in putting forward as an additional model a chassis of moderate power and efficiency to sell at a low price on British standards. This new Crossley, termed 12-14 hp., has a bore and stroke of $3\frac{1}{8}$ x $4\frac{3}{4}$ in., with block cast L-head cylinders and a detachable head. The three-bearing crankshaft is carried in a barrel-type crankcase. The rear opening of this crankcase is closed by an aluminum unit forming the flywheel bell housing, to which the bell-housing extension of the gearset is bolted. A steel pressing forms the engine oil sump, running the full length of the crankcase.

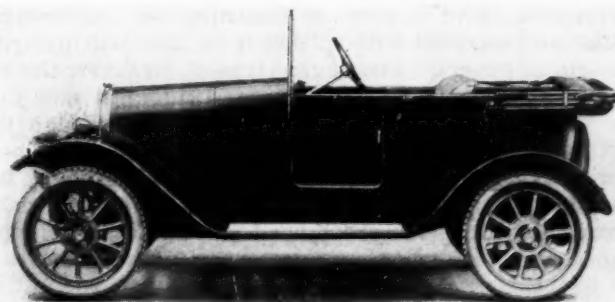
Aluminum pistons are used, with narrowed waists and three compression rings, the bottom one serving as a scraper; the piston pins float in the piston bosses and in the bushed small ends of the connecting rod. Distribution is by a triangulated silent chain driving the camshaft on the left and the generator and magneto in tandem on the right. Battery ignition was specified for this model when it was first announced, but within a week a further announcement changed this to magneto ignition. Doubtless representations from dealers against the former had some influence in this matter.

The valves are of 3 per cent nickel steel, water circulation is by thermo-syphon, and lubrication by splash with leads to catch pits over the main bearings, a plunger type of pump being used, located in the sump. The inlet and exhaust manifold are separate from the cylinder block but cast as a unit, the exhaust delivery to the muffler pipe being at the front end.

The dry, single plate clutch with fabric friction surfaces has a ball bearing pilot and is entirely enclosed,

though a small rectangular opening with a cover-plate affords an inspection orifice. Central control is provided for the three-speed gearset, which has ball bearings for the mainshaft but plain bushings for the layshaft and pilot bearing. At the rear end of the mainshaft is mounted the drum for an internal expanding brake, this being operated by the hand lever; connection from the latter to the brake camshaft consists of a short lever extension on the main lever boss which lifts a lever extending at right angles from the camshaft, contact between the two being by means of a set screw with lock nut, which also form the means of brake adjustment.

From the gearset the transmission is by an open tubular propeller shaft with a fabric joint at each end and spiral bevel gearing with a ratio of 4 to 1. The axle is of the semi-floating type with ball bearings throughout. Internal wheel brakes operated by pedal, half elliptic springs front and rear—offset in relation to the axles—pressed-



New Humber Eight with single shell body for two adults and two or three children. Sold at £275 with four-cylinder engine, 56 x 100 mm.

steel hollow-spoked wheels, 30 x $3\frac{1}{2}$ in. Dunlop cord tires with clincher edges, and worm and full worm wheel steering, are other items of the design.

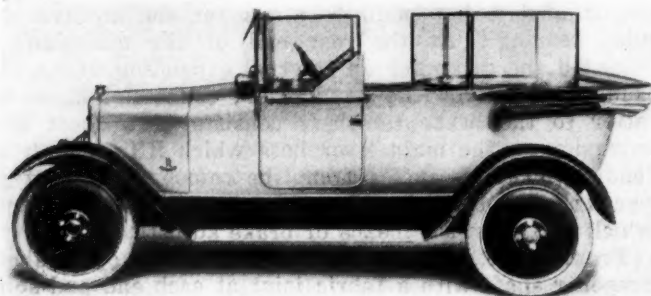
The standard body is an open four-passenger and it is to be noted that the bonnet is prolonged rearwardly and the cowl correspondingly shortened, so that the gravity feed fuel tank lies exposed within the engine space when the bonnet is raised. The complete car is priced at £50 less than the 14 hp. Wolseley, viz., £475. Its wheelbase is 108 in., track 54 in., ground clearance 9 in., and weight just over 2000 lb. with body. This car is supplemental to the 25-30 hp. Crossley (four 4 x $5\frac{1}{2}$ in. cylinders, £975) and the 19.6 hp. model (four $3\frac{1}{2}$ x $5\frac{1}{8}$ in. cylinders, £795);

the latter is a post-war model first seen at the 1920 Show and is now to be supplemented by a "sports" rendering, termed 20-70 hp., with a guaranteed speed of 70 m.p.h. and sold at £80 above the touring car price.

Humber

The products of the Humber Co., one of the oldest motor manufacturing concerns in England, have been in ascendancy since the war, after a period of pre-war depression which was only beginning to lift in 1914 and which arose from various causes concerned with management and design. During the past two years Humber cars have been confined to two models, the 11.4 hp. four-cylinder (68 x 120 mm.) and the 15.9 hp. four-cylinder (80 x 140 mm.); both have had side valve engines and have commanded a ready sale despite their high prices alongside those of their respective competitors. The plant is among the dozen largest in the country, with an output capacity of 100 cars per week.

For 1923 an entirely new model is to be made and this, as well as the other two, will have a new type of engine. The latter in each case has block cast cylinders with detachable head, overhead inlet valves and side exhausts. There has been a good deal of discussion as to the wisdom



Standard body of new Singer Ten with framed celluloid side panels as used to form V-fronted screen for rear passengers

of the policy represented by this design, especially as the all-overhead valve engine is becoming so increasingly popular and accepted without demur by the vast majority of potential buyers. The engine type is, however, the result of experiments extending from 1919 until now and it is the firm contention of Humber's that, although the splitting-up of valve position is not necessarily the best practice under all conditions, their own application of the principle gives manufacturing and other advantages which make it preferable to both L-head and all-overhead valve engines.

Humber Engine Modifications

In the first place, the overhead inlet valve and the side exhaust enable larger diameter valves to be used (55 mm. in the case of the 80 mm. bore engine) without appreciably increasing the cylinder head area. Next, the details of the design encourage the machining of all the exposed surfaces, with advantages which are obvious. As compared with the old ones of the same dimensions, these engines show a very appreciable increase in maximum power, and the peak of the power curve is carried to a much higher speed. In the case of the 11 hp. engine the increase in maximum power is 25 per cent (24 to 32 b.hp.) and in the larger type about the same, the peak of the power curve of the latter (52 b.hp.) being at 2800 r.p.m. and of the former at 3000 r.p.m.

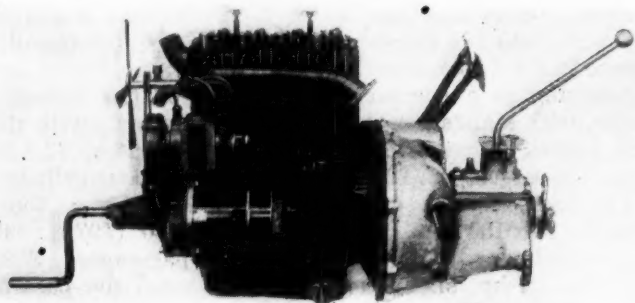
Reverting to the design of the combustion chamber, this is in the form of a short cylinder with flat top and a side pocket of horseshoe shape, the flat sides of the latter

being slightly prolonged. The underside of the cylinder head is an absolutely flat surface, being milled all over above the cylinder bores. The top of the cylinder block is also flat with the exception of the four exhaust valve pockets, which are milled out to equalize them and are thus of identical size and shape.

To minimize valve clatter, the pushrods of the overhead inlets are made in the form of straight, plain-ended rods, each working in two renewable guides, one in the head and the other in the block. With the same object in view, the valve spring pressure is divided between the valve and the rod, there being a spring on the valve as usual and another of the same size at the foot of the pushrod, each one being considerably lighter than the exhaust valve spring.

The overhead rockers are individually pivoted on pins projecting from four standards, the lower ends of which are hexagonal and form four of the nuts for the cylinder head studs. The rockers are of channel section, with the channel facing upward and drilled for conveying oil to the pivot bearings, the lubricant being fed by drips from an overhead pipe.

The upper surface of the head is flat, but slopes slightly toward the pushrod side; thus excess oil fed to the rockers



Powerplant of new Singer Ten which has barrel type crankcase cast as a unit with cylinder block. Bore and stroke are 63 x 88 mm.

runs to that side and gets back to the crankcase through helical grooves cut in the pushrod bushings, lubricating these on the way. Pushrod adjustment is made at the heads of the cam followers, the latter being exposed with those of the exhaust valves by removing cover plates as usual from the side of the cylinder block. Mushroom-ended cam followers are used.

A novel feature lies in the piston design. This, as in all Humber cars of recent years, is of the straight-sided, split-skirt type in aluminum with an internal expanding ring in the skirt; the novelty is in the crown, which has a flat surface sloping to the extent of a few degrees at right angles to the crankshaft center line. It is claimed for this design that piston slap is entirely eliminated because the explosion pressure, applying to the sloping surface, counteracts the natural tendency of the piston to tip from one side to the other at the end of the compression stroke, or the beginning of the firing stroke—a tendency due, of course, to the change in angularity of the connecting rod.

Another innovation is that on all models a muffler is fitted to the carbureter air intake; this is rendered necessary, it is said, because of the extreme quietude of the new engines. This additional device consists of a bell-mouthed attachment projecting from which is a series of pins supporting three metal rings and a flat disk, each of which is separated from the units on either side of it to the extent of 1/16 in. or so. Thus entering air is split up by being obliged to pass between the units mentioned.

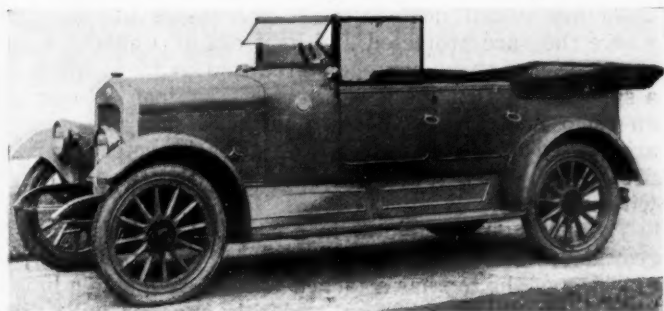
Magneto ignition is continued on the two larger engines while the battery system appears on the new Eight. The

11 hp. has had skew gears for the distribution substituted for silent chains, though one of the latter is made to serve for the combined generator and starting motor, the latter being piloted into the rear face of the distribution casing on the right, and eccentrically mounted to provide chain adjustment.

The two smaller models have the cylinder block cast as a unit with the upper half of the crankcase and both are of unit powerplant construction, though differing in the manner in which this principle is carried out. They have thermo syphon circulation, whereas the 15.9 hp. has a water accelerator on the rear end of the fan shaft.

Good Example of Light Car

The new 8 hp. model is an excellently designed example of the still smaller four-cylinder engined light car for two adult passengers which is now offered by several British makers for the first time. Hitherto, the smallest light car engine of this type has been of about 67 cu. in. capacity, whereas the Humber Eight typifies a smaller class, i. e., under 60 cu. in., its cylinder dimensions being 56 x 100 mm. But realizing that even with an engine of these dimensions users will not be satisfied to carry two passengers and no more, the makers have adopted a type of body which is found on several English cars of this size for next year. This is variously known as the "single shell"



12-25 hp. Phoenix four-passenger car with front glasses in position with folded top

and the "light family" type. It is constructed with a full-width comfortably upholstered seat in front, behind which is another full width seat but with a narrow cushion and restricted legroom, intended for two or perhaps three children; an adult could be accommodated, but not at all comfortably, sitting askew. The points of advantage of this design, as compared with the dickey seat alternative, are that all occupants are within the main shell of the body and are equally well protected whether the folding top and detachable side panels are in use or not. Further, the restricted dimension of the rear seat and the fact that no separate entrance is provided to it discourages its use by two adults—for it is the maker's idea to prevent the overloading which almost invariably occurs when a dickey seat is provided.

There is nothing unorthodox about the chassis design and transmission, except the frame, which is reminiscent of Marmon practice, the side members having pressed steel running boards welded to them; they are unusually deep between the springs and of inverted L sections, merging into a channel section toward the ends with the channel outward. The springs are quarter elliptic at the front and half elliptic at the rear. The brake pedal applies a contracting band on a drum behind the three-speed gearset, while hand-applied contracting band brakes are used on the wheel drums. A point of note is that, although the unit gearset has right-hand side control, the "gate" usual with this arrangement is here omitted.

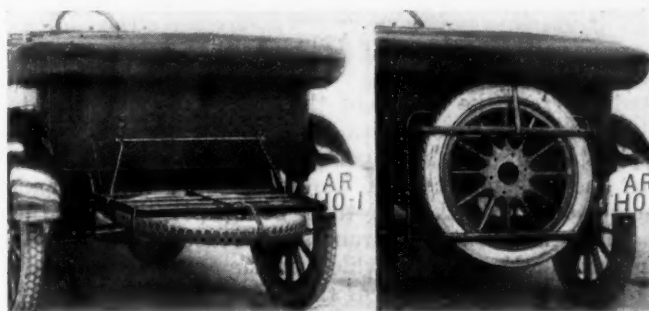
At 3000 r.p.m. this engine develops approximately 20 b.hp. and at this engine speed with the 28 x 3 in. wheels and 4.9 to 1 spiral bevel ratio a decidedly high road speed—approximately 42 m.p.h.—is attainable on level roads with two adults aboard.

One other point of this new chassis can be mentioned. The front swivel axle bushes are lubricated with oil stored alongside them within a chamber formed by drilling a vertical hole in a long boss integral with the forging, while the joints of the tie-rod are supplied with oil stored in the rod itself, the latter being hollow and having a lubricator for the introduction of oil.

With the bodywork specified the 8 hp. Humber sells at £275. The 11.4 hp. four-passenger is £525 (1922 price £620) and the 15.9 hp. five-passenger with rear cowl and screen £750 (£850 for 1922). An addition to the range of body types for the large chassis is an all-enclosed landaulet, having a V front double panel screen and instrument board, the latter items being standard on all bodies except that of the 8 hp. chassis.

Singer

The Singer Co., Coventry, has varied neither the fundamental features of its design nor the engine dimensions since 1912, when it came out with the first four-cylinder 67 cu. in. light car. Neither has it departed from the two-



Phoenix luggage grid and wheel carrier shown in two positions, in both of which the wheel is readily accessible

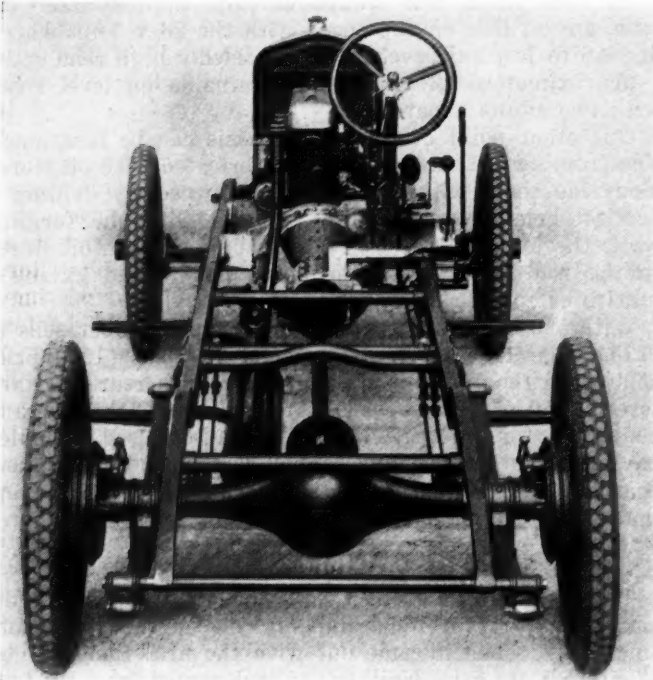
passenger body with a small dickey. The 10 hp. Singer two-seaters have experienced a demand second to none in this field, and have held the firm in a strong financial position for many years past.

But an entirely revised design has now been adopted. In place of pair-cast L-head cylinders, and a three-speed gearset as a unit with the rear axle, an overhead valve engine with block cast cylinders and pushrod operation has appeared, and a gearset as a unit with the engine. While the engine dimensions remain the same (63 x 88 mm.) the chassis layout has been varied so as to accommodate a small four-passenger body, the wheelbase remaining the same (96 in.) though the track has been increased from 46 to 48 in.

Singer Shows Unusual Features

An unusual feature of the engine design is the use of a cast-iron unit comprising the cylinder block and the entire barrel type crankcase, the latter having a large opening at the rear end through which the two-bearing crankshaft is assembled. The crankcase has a pressed steel oil sump, and its rear end is formed with a large flange to meet the bell housing extension of the gearset.

The induction manifold is also cast as a half-projecting unit with the cylinder block, but the exhaust manifold is separately cast with four branches to the valve ports. Engine support is afforded by two tubular cross members, the front extension of the distribution cover sus-



Rear view of 12-25 hp. Phoenix chassis. Has pushrod operated valves and a bore and stroke of 69 x 120 mm.

pending from the center of the cross tube there located, while the rear tube passes through the clutch pit. The application of this arrangement is simplified by the fact that the side members of the frame have their channels facing outward, this in turn being permitted without spoiling the front appearances by reason of the use of quarter elliptic springs which, incidentally, are bolted up directly to the underside of the channel members and run parallel with the latter. An open propeller shaft with fabric joints, a tubular torque member, spiral bevel final drive (ratio 4.1 to 1), all brakes within the rear wheel drums, epicyclic steering gear and disk wheels with 26 x 43 in. straight-side tires (the only British light car having the latter) are other design features. The peak of the engine power curve is just over 3000 r.p.m., at which speed 20.75 b.h.p. is developed.

The standard four-passenger body has only one door, on the left at the front, entrance to the rear seats being secured by lifting up the left front seat, which is hinged to the floor and has a hinged back rest. This hinging seat is of neat design, having an exposed bottom framing of cast aluminum with an integral footrest for the rear passengers.

The folding top is supplemented by something out of the ordinary in the way of transparent detachable side panels; the latter are of larger area than usual and consist of three sections at each side, the front one being a single unit and the others united by a hinge; this last feature enables the two rear panels to be used even when the top is folded, for the front halves can then be brought across to meet at the center of the car and so form a V fronted screen for the rear passenger.

At the last Olympia Show Singers exhibited a small Six with L-head block cast 65 x 100 mm. cylinders. This model is, however, only now going into production. There is nothing much out of the ordinary in the layout, though it varies from the smaller model at many points; for example, it has its three-speed gearset as a unit with the torque tube.

The Singer Ten is also to be sold under the name Coventry Premier, the makers having bought out the in-

terests in the latter name, which previously has been associated with a two-cylinder three-wheeled light car. The 1923 Coventry Premier is, however, identical with the Singer Ten except that it has battery ignition in place of a magneto and is minus the side panels of the folding top and one or two other items of equipment. Prices compare as follows: Coventry Premier, £250; Singer Ten, £295 (last year £395 with two-seated body); Singer six-cylinder four-passenger, £550.

Phoenix

An old-established firm with an excellent reputation for small cars, the Phoenix Co. introduced an 18 hp. ($3\frac{3}{8}$ x 5-5/16 in.) overhead camshaft model at the 1920 Show. Although it was again exhibited last year it has not yet gone into production, but is held up until better times come along for cars of that size. Now the range has been supplemented by a smaller overhead valve pushrod operated model termed 12-15 hp. with $2\frac{3}{4}$ x $4\frac{3}{4}$ in. cylinders. There is nothing peculiarly striking in the chassis, but the all-weather feature is out of the ordinary.

The standard four-passenger body has a folding top with an all-metal framing and covered with black material lined with grey. When erected the top fits snugly to the top rail of the double panel screen. To the top edge of each of the four doors of the body a rectangular metal-framed plate-glass window is hinged; normally these windows are folded down against the inside of the doors, where they are protected and kept out of sight by a light metal frame, suitably upholstered and padded, which has a spring hinge on the lower part of the door. To provide an enclosed car, the top is erected and then the windows are hinged upward—the top edge of each protecting frame first being pulled toward the inside of the car to free the window.

To secure the windows in a vertical position over the rear doors and to allow them to open with the latter, the framing of the top has attached to it at each side a bracket carrying a spring plunger, and this engages with corresponding brackets at the top of the window framing. The brackets are positioned so as to be located in a direct vertical line above the door hinges, making in effect one continuous hinge from the bottom of the door to the top corner of the window, so that door and window can open together without twisting any part. The windows over the front doors are similarly provided for, though in this case the upper brackets are attached to the windscreen pillars, thus permitting these windows to be used as side wing screens when the top is folded.

Improvement in Window Adjustment

Any or all of the windows can be used when the top is erected, and all can be brought into use in less than two minutes, without disturbing the passengers and even without stopping the car. This arrangement is unquestionably a great improvement on anything of the kind introduced until now, for there is not the call for special drawers or loose upholstery to store away detachable side panels, and the fact that plate glass can be used safely instead of celluloid is in itself a point in favor of the scheme. Compared with many of the other systems for providing side panels that open with the doors of open cars, there is seemingly little if any difference in production cost to be considered, though obviously there are certain bodywork features which must be adopted if the system is to be used. There is, however, one point against this plan—that quite a big portion of the top extends around its sides, as far forward as the back of the rear door. Compared with other arrangements, where usually there is a transparent panel at each side of the rear seat, the interior is not so light when the top is erected.

Why Is an Automobile Finance Company?

Distinct need for such organizations. Sound banking principles needed throughout operation. Dealers need assistance in handling credits. Manufacturers sell C. O. D., but have responsibility to assist retail representatives. Extensive credit education needed.

WHY are automobile financing companies?

That's a question a good many people in the automotive industry are asking themselves for various reasons. The inquiry is based in some cases upon the premise that they are unsound in principle. Any such assertion is incorrect, however.

Organization and development of finance companies have been perfectly logical. Theoretically, banks should finance all the legitimate needs of every reputable business and industry. This theory doesn't work out in practice and that is the real answer to the question, "Why are automobile financing companies?"

If the banks had been able to extend to motor vehicle dealers all the credit to which they were entitled, there would have been no excuse for the finance company. Given an automobile dealer and a hardware dealer of equal merchandising ability and an equal annual profit, one is as good a credit risk as the other, but the banks can't see it that way. They are thoroughly familiar with the hardware dealer's methods, which have been standardized by long years of practice, but they don't like the system in vogue in the automotive industry, under which the dealer gets his goods on a C. O. D. basis and sells large units on a time basis, usually 30 per cent down and the remainder in a series of twelve equal monthly instalments.

The banker will admit readily enough that the motor car dealer may be just as good a risk as the hardware man, but he will contend that so much bookkeeping and collection machinery is necessary to handle the automobile paper that it cuts too deeply into the profit. This may be true, although a large number of banks have built up a substantial business in the prime mercantile paper resulting from automobile sales, wholesale and retail, and are making a good profit out of it.

Driving a banker into giving you a line of credit is not a pleasant diversion for a hot summer's day, however. When the automotive industry began to reach large proportions it became apparent that something had

to be done about credit. Then it was that the automobile finance company came into being. The pioneers in the field were concerns which had been financing time sales of pianos and other things. They had the machinery and they adapted it to the needs of a new industry. The adaptation wasn't perfect but it brought substantial profits. In the earlier years the profits were so large that many exclusive automobile financing companies were organized. Some of them operated on a national

basis and some of them were local in their scope. The local company of late has been getting much more of the business than it did formerly.

Theoretically, the paper which is good enough for a finance company to buy should be good enough for a bank. A very large percentage of automobile paper, both wholesale and retail, comes in this class, but the banks assert they don't want to be bothered with the details of credit risk investigation and collection. They frankly admit that they would rather loan their money to the finance company at a lower interest rate and let the finance company, which has the

machinery, do the work of investigation and collection.

In the last analysis it is the banks which really are financing the business through their loans to finance companies. If the finance company is unable to borrow money at the bank it can't function. That is the reason why a good many of the so-called local companies give the motor vehicle dealer good service in periods when money is "easy," but have nothing to loan the dealer in times of depression when money is "tight." In other words, some of these companies, but by no means all of them, are unable to assist the dealer when he most needs their help.

Scattered here and there throughout the country are motor vehicle dealers who are strong enough financially to get all the credit they need at their own banks, but they constitute a small minority of the whole. Many more dealers are able to meet some of their credit needs through their own banks. If there are any dealers who

THERE may not be enough efficiently managed finance companies in the field to take care of automotive business. The banks will handle only a certain amount under given conditions. Dealers must have adequate credit facilities or sales will not reach maximum possibilities.

Future conditions may indicate the desirability of the larger and stronger automotive manufacturing companies forming finance companies of their own. Several smaller manufacturers might band together for the same purpose.

This article discusses the whys and wherefores of the automotive finance corporation and points out ways to remedy the difficulties which exist to-day in many cases.

have no bank credit, they ought not to be selling automotive merchandise.

Financing the sale of motor vehicles, at wholesale and retail, is one of the big problems of the industry. So long as manufacturers insist upon selling their products on a C. O. D. basis their dealers will require longer lines of credit than business men of the same ability who sell other merchandise of equal value but who are given 30 or 60 days in which to meet their bills, thus having an opportunity to turn over a good share of the goods they sell before they have to pay for them.

Inasmuch as it is this factory custom which has made it necessary for dealers to obtain a larger volume of credit than is necessary for dealers in any other line, the factories have an obligation to their sales organization to help solve this problem.

As the situation stands to-day, dealers for most of the companies in the field have to fight their credit battles unaided. They stand or fall by their own efforts.

Part of the trouble is the fault of the dealers, part is the fault of the finance companies and part the fault of the factories. Generally speaking, neither is trying deliberately to "trim" the other. Many dealers have not realized their obligation as merchandisers and many finance companies have not sensed their duties as bankers.

Finance companies, logically, should be operated on exactly the same principles as banks, except that they require specialized machinery. They should be regulated by State banking departments. They should not go into the insurance field or any other field with which a bank should not meddle. They should study their credit risks just as carefully as a bank. They should give sound co-operation and advice to their clients. They should strive to make their clients better business men. Their own honesty and squareness should be above reproach and they should refuse credit absolutely to any dealer suspected of shady practices. On the whole, finance companies probably have been victimized more often than they have made victims.

Success Depends on Sound Practice

The men who operate finance companies should be thoroughly familiar with banking obligations and banking practices. They should be perfectly frank and fair in their dealings with their clients and they should insist upon reciprocity in this respect. Their success or failure, in the long run will rest upon the care with which they scrutinize credit risks. Any practice which is fundamentally wrong will cause trouble sooner or later.

When a finance company is asked by a dealer for accommodation to permit him to stock cars on his floor, it should assure itself that the operation will be a good credit risk. If the answer is in the affirmative, the loan is justified. If there is any question about it, the loan should be refused.

When a finance company is asked to purchase the paper arising from the sale of motor vehicles at retail, it should ask itself two questions:

1. Will the dealer honor his endorsements?
2. Will the purchaser pay his notes?

If either answer is negative, the paper should not be bought.

If the risks are sound and if the losses of a finance company on defaulted payments are small, it will be able to offer a lower rate than it would if it had to set up a large reserve for losses.

All business if founded on mutual confidence and the dealer has two obligations in respect to credit. One is

to himself and the other is to the bank or finance company which extends him credit. In his merchandising operations, if he is fair to himself, he usually will be fair to the institution from which he has borrowed.

There is nothing intrinsically wrong with the sale of motor vehicles on credit. In fact it is a perfectly sound proposition. Many of the abuses which have arisen have resulted from the eagerness of the dealer to increase his sales. It should be accepted as an axiom that no person who cannot afford a motor vehicle should be permitted to buy one on time.

If every dealer made a careful and intelligent investigation of the credit standing of every prospective purchaser on an installment basis and assured himself that he never sold anyone who could not afford to buy, most of the evils which have arisen in the retail automobile financing field would disappear.

Reducing Credit Risk

An equally important forward step would be taken if banks and finance companies would refuse to extend credit for wholesale purchases to any dealer who was not himself a good credit risk. There would be few dealers who would not be good risks if they conducted their own credit operations on sound lines.

No company which expects to build on a permanent basis, can afford to have in its sales organizations any man who is not a good credit risk or accepts credit risks which are not good. No company can afford to have its products sold on time to persons who cannot afford to buy them.

It cannot be denied that there are many evils in connection with automobile financing. It is equally true that the manufacturers of motor vehicles owe a distinct obligation to their dealers and themselves to help eliminate these evils.

This can be done primarily through a process of education. The average dealer takes very seriously all the suggestions made by his factory. Every company in the field could well afford to conduct a sort of training school in merchandising and financing for its dealers. This could be done by traveling teachers who would help individual dealers solve their problems, supplemented by periodical "classes" held at the factory or at some central point at which all the dealers or the men from some large territorial division could be given brief but intensive courses. Obviously, this instruction should be thoroughly sound.

Education and Cooperation Needed

At the same time, manufacturing companies should begin educating the finance companies to their obligations as bankers. This work should be undertaken in a spirit of co-operation based upon the fact that the finance company is a very sound and very necessary institution.

Such a procedure would enable manufacturers to weed out not only inefficient dealers but inefficient or unfair finance companies. Finance companies which are not willing to institute reforms where reforms are needed should be forced out of the field. The same is true of dealers who do not play fair with the people from whom they borrow money.

If it were demonstrated eventually that there were not enough sound and efficiently managed finance companies in the field to supply all the credit needed, then the larger and stronger automotive manufacturing companies could form finance companies of their own. It might be possible, also, for several of the smaller companies to band together and form a company which would be able to finance all their dealers. If such com-

panies were formed, however, they should be operated as distinct entities engaged exclusively in the banking business.

Observations on finance companies up to this point have been confined to those which do not do business on a "no recourse" basis. "No recourse" means that dealers do not indorse their paper. The company demands a certain percentage of the total price as a down payment, has the vehicle insured against fire, theft and collision, in some cases, then takes a lien on it and trusts to luck. If the purchaser does not make good on its notes, the

finance company replevins the vehicle at the earliest possible moment and then gets its money back by selling it to someone else.

In theory, at least, this practice is unsound for it combines within one company the functions of banking and merchandising. The same is true of companies which engage in the insurance business in a similar way.

Fundamentally, if the motor vehicle dealer is merely to sell cars or trucks and not accept his own credit responsibilities, he is merely an order taker and is entitled only to an order taker's commission.

A Radical Departure in Suspension Springs

IN the design of springs for automobile chassis the aim is to keep the stresses due to the load and to shocks as nearly as possible uniform throughout the mass of the spring material, as this results in the best cushioning action with a given amount of such material. This is ordinarily accomplished by using leaves of graduated length, assembling the spring out of a number of such leaves. To prevent the leaves from separating during the rebound they are given a nip, the short leaves being nipped more than the long ones, so that they are under comparatively high initial stress. This nipping process involves certain difficulties and often is the cause of excessive local stresses.

An entirely new design of spring in which uniform distribution of stress is obtained in a novel manner has been introduced by W. D. Kelly and is illustrated by the drawings herewith. It is a laminated leaf spring, but all of the leaves are of full length and they are not nipped. Under static load the leaves are substantially straight. In order to take account of the decreasing bending moment from the center of the spring outward, the leaves are given the form of a frustrated rhomboid. A slight modification from the rhomboid form is necessitated by the shear stresses which near the ends of the leaves become more important than the bending stresses. All leaves are arched to the same curve, which is an arc of a circle.

In an ordinary leaf spring, owing to the differential nipping, when the spring as a whole is in the neutral position some of the leaves are under stress in one direction and the others in the opposite direction. All of the leaves of the Kelly spring have the same neutral point or position. In case the vertical acceleration should carry the chassis above the neutral point of the spring, excessive reverse bending is prevented by the combined

action of all the leaves of the spring.

To reduce the friction between the leaves, the inventor has made provisions to keep them separated from one another over practically their whole length. Spacers $1/32$ in. thick are placed between leaves over the axle, and the ends of the leaves are upset to increase the thickness $1/32$ in. at these points. This spacing of the leaves, however, is not an essential feature of the new springing system, the inventor evidently realizing that many manufacturers consider a fair degree of friction between leaves as highly desirable. One of the claims made for this spring is that the danger of leaf breakage has been greatly lessened. Two causes of uneven distribution of stress, namely, nipping and rusting together of leaves, are eliminated. Although the center bolt hole—another cause of leaf breakage—has been retained, the leaves are made considerably wider at the center than those of the ordinary spring, hence an adequate factor of safety is provided at this point, too. No rebound clips are used. The spring eyes and their bolts are replaced by what are termed journal segments, which have a liberal bearing surface and are well provided for in the matter of lubrication.

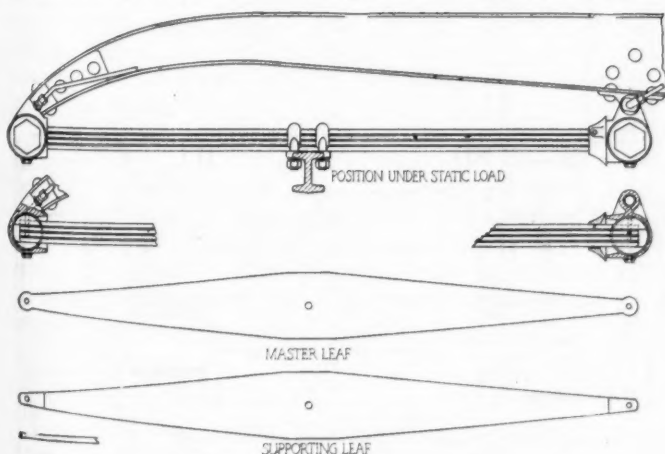
Design of Spring Leaves

The master leaf is so shaped that it fits into a recess of the journal segment and takes the horizontal component of the road resistance, acting as a radius rod as well as cushioning member during deflection. The leaves of the spring are referred to as the master leaf, the supporting leaves and the bottom leaf, the latter differing from the rest in that it has no oil hole through it and its ends are beveled to allow more clearance as it slides forward when the spring is deflected.

The journal segment bears against the bushing and is provided with an oil hole and an oil groove, distributing the oil to its own wearing surface and to the spring leaves below it. The bushing is locked in place by a screw which enters it from bottom of bracket casting.

The key segment locks the spring and journal segment in place. The assembly is free to rotate about the center line of the bushing and the supporting and bottom leaves are free to slide as the spring deflects. The oil path is shown by dotted lines in the cut-away sections of the drawing.

THE Swedish body building industry is very small, the entire annual output never having exceeded 150 bodies, most of which are made of wood, and while some fine special bodies were turned out during the war, the average output does not compare favorably with American and other foreign makes in price, quality or appearance, says a report from Assistant Trade Commissioner H. Sorensen, Copenhagen.



Details of Kelly suspension spring showing design of master leaf and supporting leaf

Dort Announces Its First Six-Cylinder Product

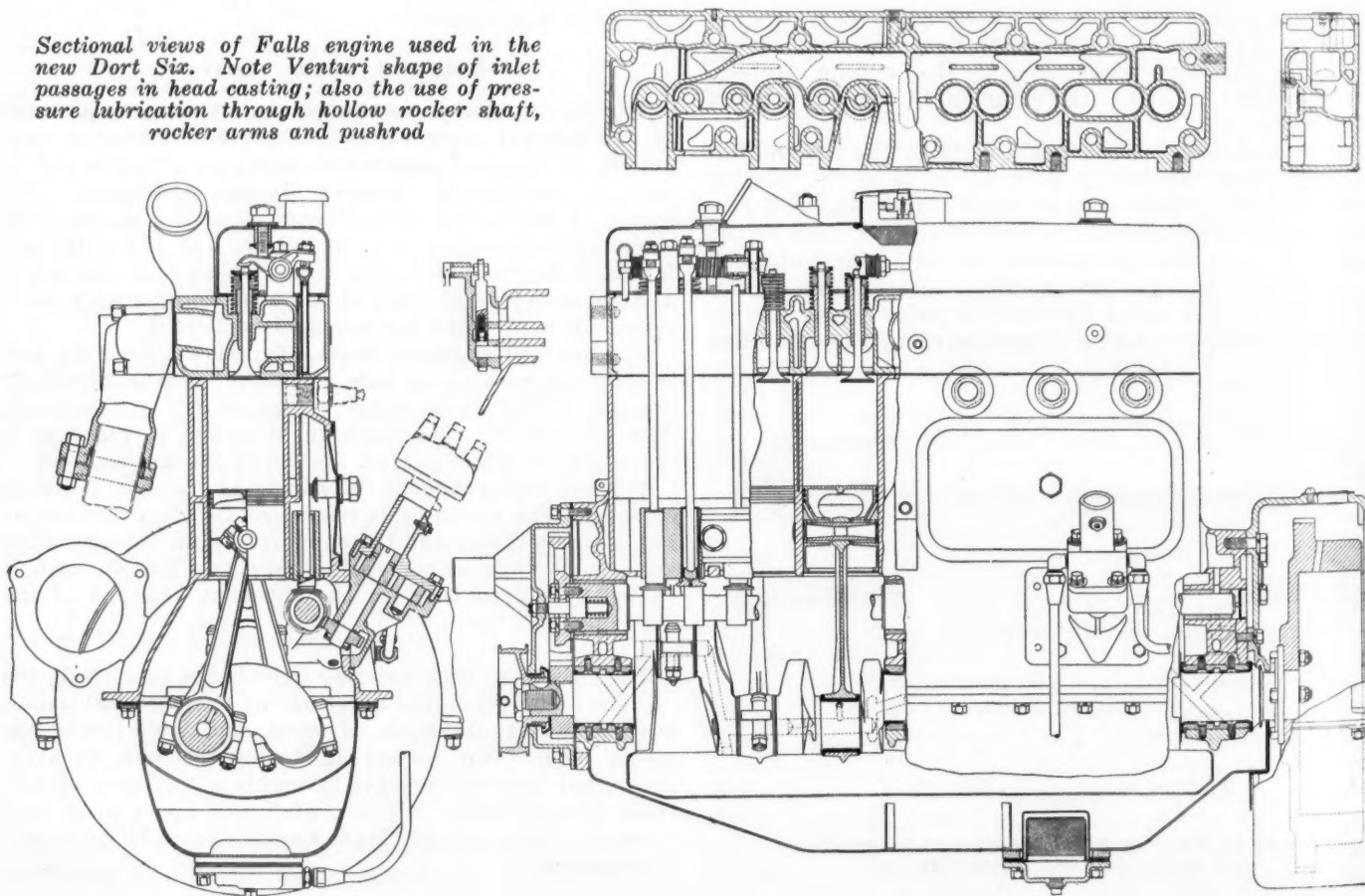
New car is similar to the four except in external appearance. Has 115 in. wheelbase. Model T-8000 Falls engine incorporates a stiffer crankshaft and other changes suggested by Dort engineers. Silcrome valves and pressure lubrication employed.

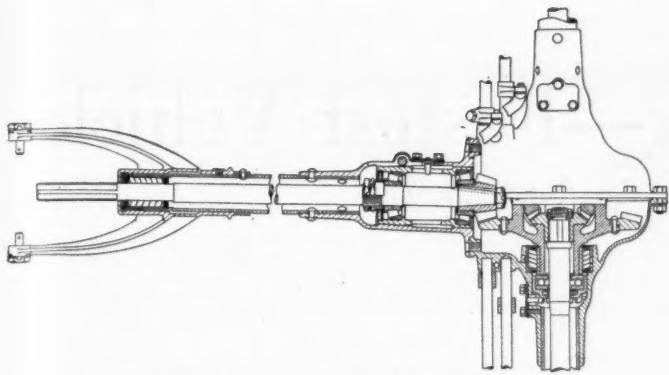
By J. Edward Schipper

THE Dort Motor Car Co., which has previously manufactured only four-cylinder cars, has added a six to its line. The new six, while following fundamentally the lines of the previous Dort cars, differs in many respects in exterior appearance. Mechanically, the six is similar to the four, employing a great many standardized units similar in both cars, but, of course, differing as to engine and in the parts requiring heavier construction, due to the increased stresses of the more powerful engine. The wheelbase is also longer, being 115 in. in the six-cylinder model as compared with 108 in. in the four.

The engine is the Falls model T-8000, which is familiar to the industry, but which has been modified, however, by design features incorporated by Etienne Planche, chief engineer of the Dort Co. The modifications include a redesigned intake manifold with a venturi effect due to a taper in the diameter and easier interior curves for the purpose of securing superior distribution and carburetion throughout the entire range, especially at low speeds. The crankshaft also has been increased in diameter to help minimize periodic vibrations within the speed range of the engine. The engine is a high-speed design turning over 3000 r.p.m. at 60 miles per hr.

Sectional views of Falls engine used in the new Dort Six. Note Venturi shape of inlet passages in head casting; also the use of pressure lubrication through hollow rocker shaft, rocker arms and pushrod





Flint axle used on new Dort chassis. Hyatt bearings are now employed at differential and at forward end of propeller shaft

car speed. It is an overhead valve type $3\frac{1}{8}$ -in. bore by $4\frac{1}{4}$ -in. stroke, or 195.06 cu. in. piston displacement. The combustion chamber volume is 21.82 per cent of the total volume, giving an actual compression pressure of 74 lb. per sq. in. at 300 r.p.m.

The crankshaft in the Dort adaptation of the Falls engine is mounted on three bearings, the dimensions being from front to rear as follows: 2.10 in. by $2\frac{5}{32}$ in.; 2 in. by $2\frac{1}{8}$ in.; 3 in. by $2\frac{3}{32}$ in. The lower rod bearings are 1.997 in. in diameter and 1.626 in. in length. These are steel backed, babbitt lined bearings, the babbitts being bonded to tin and the tin bonded to the steel.

Probably the outstanding features of this particular engine is the fact that it has a built-in pressure feed oiling system, which feeds the overhead valve mechanism. Oil is led under pressure through the rocker shaft, then through drilled passages through the rocker arm to the top of the push rods. The top of the push rod ends in a cup in which the ball end of the rocker arm operates. Oil flowing under pressure from the rocker arm shaft through the drilled rocker arm comes out through a hole in the ball and into this cup. This keeps the cup and ball

continually lubricated and provides a liberal film to cushion the shock. A lead passes down through the push rod to the tappet so that the cam contact is also lubricated. Another feature of the valve action is the employment of the new silicon-chrome alloy called silcrome, a product of the Steel Products Co. The engine installation on the Dort car is thermo-syphon cooled, through a Fedders radiator.

The engine auxiliaries include a Carter carbureter, 1 in. size, American Bosch starting, lighting and ignition in combination with a U. S. L. 6-volt, 90 amp. hr. storage battery. The clutch is a multiple-disk Detlaff. This is a dry type with six disks. The gearset is the same unit used in the four and manufactured by the Dort company itself. The drive is taken from this through a Mechanics Machine Company's universal joint to a three-quarter floating Flint axle. The drive is taken through the rear springs and the torque is taken through the third member of the rear axle by means of a yoke at the front end of the tube which incloses the propeller shaft. This is the same construction and same axle used in the four-cylinder model.

Some notable features of construction which have been adopted recently in this axle are the mounting of the differential between two Hyatt roller bearings in order to secure the advantage of the long line support in these two points and also the mounting of the long series Hyatt roller bearings at the front end of the propeller shaft for alignment of this unit. The rear axle ratio on all body models is 4.66 to 1. The wheels are all 31 by 4 in. equipped with cord tires. Steering is by Gemmer gear.

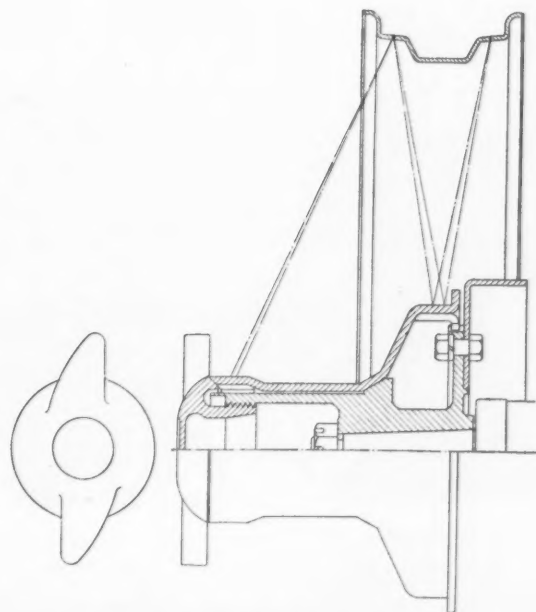
Six bodies are provided. These are a five-passenger touring car at \$990; three-passenger roadster, \$990; five passenger Yale sedan, \$1195; three-passenger Yale coupe, \$1145; five-passenger Harvard sedan, \$1495; three-passenger Harvard coupe, \$1365, all of which are in addition to the four-cylinder models, which will be continued unchanged except for a new shaped hood and radiator.

Wire Wheel for Straight Side Tires

A WIRE wheel for clincher tires which is claimed to be considerably lighter at the rim than the ordinary wheel with demountable or detachable rim has been brought out by the Dayton Wire Wheel Co. It is of the demountable type, as may be seen from the sectional view shown herewith. A feature of the design is that the center of the rim is dropped, the whole rim being made in a single piece.

B. G. Parsons, chief engineer of the Dayton Wire Wheel Corp., informs us that he has been using a set of these wheels in the 28 x 4 in. size for some time and that they were also used in the Indianapolis 500 mile race on the two Fronty-Ford entries. As regards tire changes, they are said to be quite simple, as the same conditions exist as in the plain clincher tire. The general construction of the wheel may be seen from the drawing.

THE Automotive Division of the Department of Commerce reports that in keeping with incoming reports that motor sales have been very good in Spain, that country imported 239 passenger cars and 62 trucks from the United States during June, as compared with 141 passenger cars and 3 trucks during the previous month.



Sectional view of Dayton wire wheel

Curtiss-Army Racer—Fastest Vehicle Ever Operated

Winning machines in Pulitzer race have exceedingly small sectional area and a wing section said to have lowest resistance of any known. Gross weight 1950 lb. Span 19 ft. Engine develops 140 b.m.e.p. at 2200 r.p.m. Radiators a feature.

By Herbert Chase

RECORDS in speed making invariably attract considerable notice, and the recent performance of the Curtiss-Army racers in the recent Pulitzer race is no exception to this rule. When it is realized that the resistance to the passage of any vehicle through the air increases as the square of the speed, and that the power required to propel it, so far as wind resistance is concerned, increases as the cube of the speed, it is evident that areas causing resistance must be reduced to the lowest possible figure if maximum speed from a given assembly is to be attained. Precisely this consideration was given primary attention in designing the plane which won the race. There were in the race planes carrying much higher powered engines but apparently none with so high a ratio of power to resistance.

The Curtiss school of design has adhered to the practice of using the thinnest feasible wing section and then fairing non-lifting surfaces to the best possible degree, rather than following plan of making all exposed surfaces lifting surfaces by employing a deep wing section within which all non-lifting surfaces are concealed.

From the front view of the machine here described it will be seen that the fuselage has a section only just large enough to inclose the engine and pilot, while the non-lifting surfaces are not only small but are faired with great care. All fittings are inclosed. There is but one

I-shaped strut between wings at each side, only two struts are used for the landing gear instead of four, while the number of wires used is a minimum.

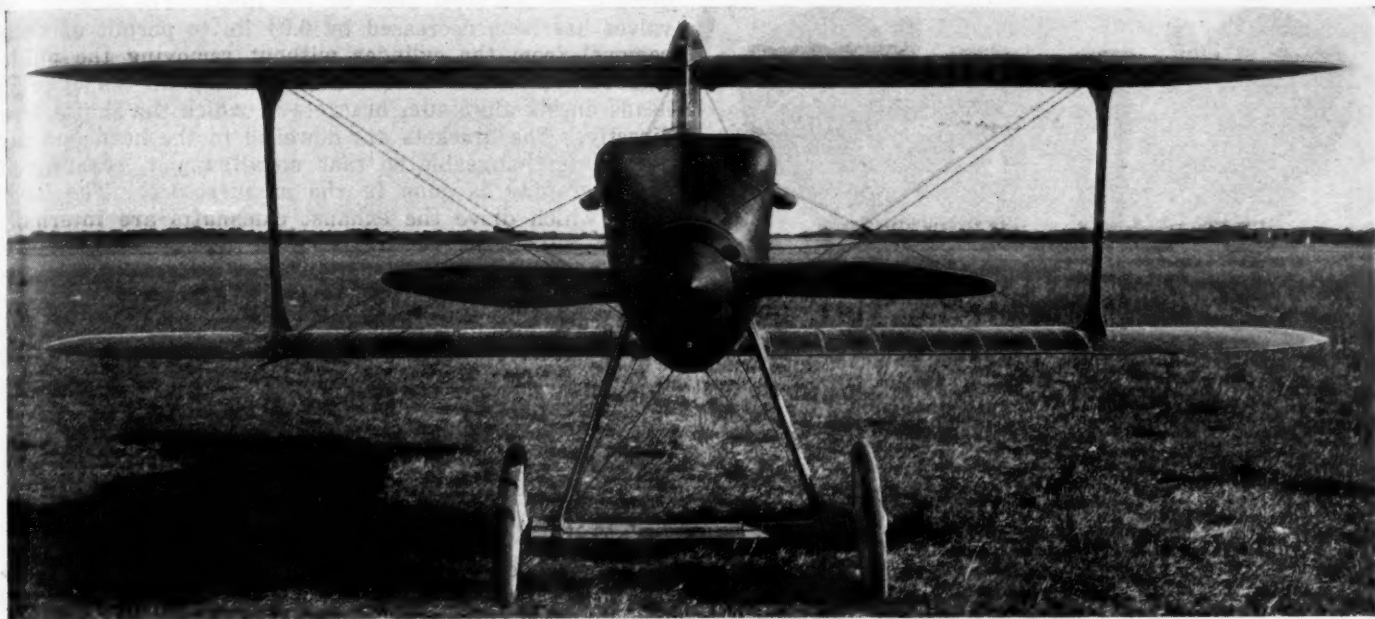
Of greatest importance, however, from the standpoint of low resistance is the use of wing-type radiators. Various experiments with this type of radiator have been made in other quarters, but it has remained for the Curtiss Co. to perfect a design which successfully withstands conditions as severe as those encountered in the recent race. In this case the radiators are said to offer no more resistance than a bare wing. They consequently eliminate what has heretofore been one of the largest elements in creating drag.

Wing-Type Radiators

The radiating surface is formed by a corrugated sheet of brass which is soldered to a plane sheet at the edges of the corrugations. This leaves passages of triangular section measuring about $\frac{1}{8}$ in. on a side through which the water flows from front to back of the wing. Radiator sections are made up in strips 9 in. wide and of a length equal to that of the curved surface of the wing. In this case the wing is covered both top and bottom and the upper and lower sections are joined in headers which form the leading and trailing edge of the wing. Water leaving the engine enters the header in the leading edge and after



Comparative photograph of the Curtiss-Navy and Curtiss-Army Racers which won the Pulitzer race last year and this year, respectively. Both are fitted with Curtiss engines of the same displacement and basic design, yet this year's machine made nearly 30 mi. faster speed due to its lower resistance to passage through the air. The chief changes are a slightly shorter span, use of wing instead of Lamblin radiators, single strut instead of V-strut landing gear, I instead of N-struts, fewer wires and smaller projected area of body. The views well illustrate a year's advance in fast plane construction



Front view of the Curtiss-Army Racer which won the recent Pulitzer race, making an average speed of 206 m.p.h. The same machine later established an official world record of 224.05 m.p.h. for one kilometer. Note the exceptionally small frontal area, and the location of the wing radiators, which cover both sides of both wings between the two struts

passing through the upper and lower sections is drawn out through the header in the trailing edge. The radiator thus forms an envelope which in this case completely incloses that portion of the wings between the two struts. The radiator does not replace the normal wing covering, however, but is placed over this covering and is held in place by bronze bolts which pass through the upper and lower sections as well as through the wing covering. The fact that the radiator is not designed to act as a structural element may well have much to do with the success attained with this design. The arrangement employed is clearly shown in the photograph.

The body of the machine is formed from two-ply spruce $\frac{3}{32}$ in. thick. Fittings are made from duralumin, a fact which accounts in part for the light body, the weight of which is said to be only 127 lb. The projected area of the body is 25 per cent less than that of the Curtiss-Navy racer which won the Pulitzer race last year, although it is fitted with a very similar engine.

Multispar wings covered with two-ply veneer are employed. These are a typical Curtiss type of construction, the nature of which is well illustrated in the accompanying cut of the upper wing panel. There are five spruce

a factor of safety of over 10. The fittings are recessed within the wing, the opening being covered with fabric.

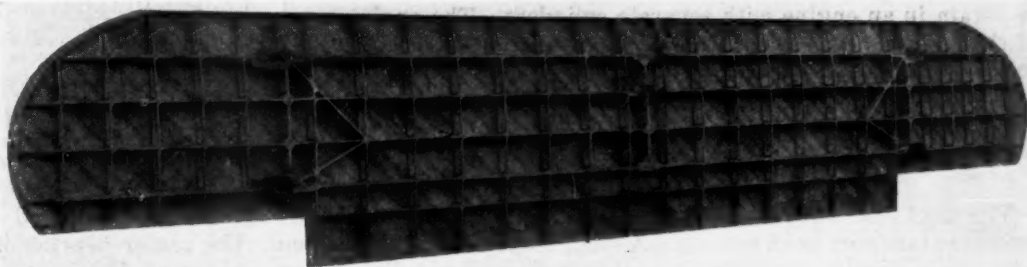
The wing section used is known as Curtiss No. 27 and was developed from data obtained in the wind tunnel at the Garden City plant.

The fin and stabilizer surfaces are also of plywood construction without external braces, while the control surfaces, ailerons, elevators and rudder are of duralumin and steel with linen covering. They weigh 0.7 lb. per sq. ft. of area. All controls are actuated by internal cables and tubes.

The chassis, with a single strut at each side, is braced by streamline wire and is said to have the strength and rigidity of a conventional V-strut arrangement while its resistance has been reduced two-thirds as compared with earlier types. The wheels are provided with cupped disks which cover the wheels and hub and a linen covering is applied over the wheel and tire in order to give it a minimum parasite resistance.

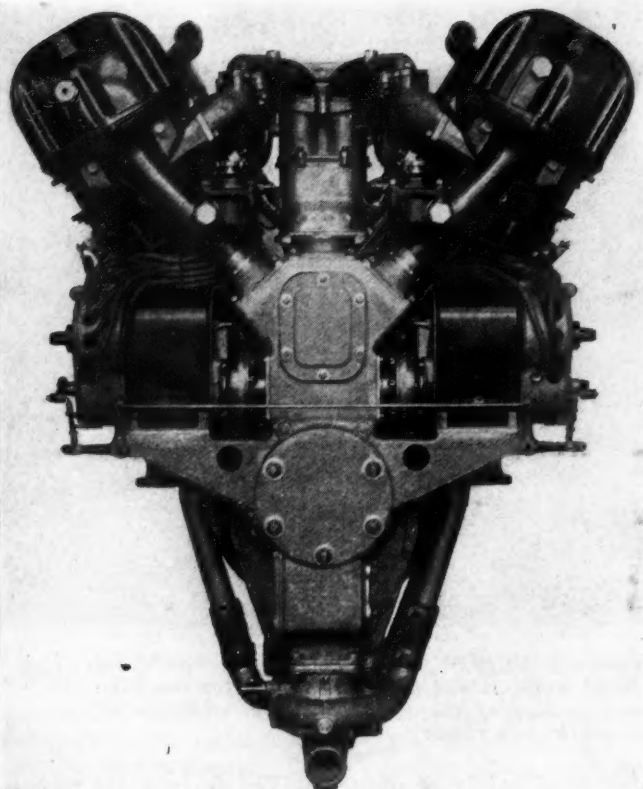
It is interesting to compare the machine above described with the Curtiss-Navy racer which won last year's Pulitzer race, making an average speed of 176.7 m.p.h. The two machines are equipped with an engine of the same size

Upper wing panel of Curtiss-Army Racer. Note the five spars and covering of two-ply spruce veneer. The ailerons are pivoted on tubes carried within the wing



spars, four of which run the entire length of the wing. The deepest of these measures about $3\frac{1}{2}$ in. The ribs are spaced about 8 in. apart, are cut away for lightness and are glued with corner blocks to the spars. The framework thus formed is covered with veneer strips screwed and nailed in place, and the latter is covered with a batiste which gives a good surface to hold the waterproof finish. This structure weighs 1.2 lb. per sq. ft. and is said to have

and are of the same general design, yet the later machine maintained a speed nearly 30 m.p.h. faster in this year's race. This is evidently due to the "cleaner" design and consequent lower resistance of the later plane—a feature which is at once apparent from a study of the photographs of the two machines here reproduced to facilitate comparison. They well illustrate the advance made in the past year in the design of fast planes. The major specifi-



Rear view of the Curtiss Model D-12 engine used in the Army Racer. The separate gearcase which carries nearly all the gearing as well as the magnetos and water pump is clearly shown.

cations of the two machines are given in the appended table.

The engine used is known as the Curtiss Model D-12. The basic design is the same as that of the Model CD-12 used last year, but has undergone extensive alterations in a number of important particulars which have resulted in decreasing the weight by 35 lb. and increasing the output by 10 to 15 hp. Power torque and fuel consumption curves of the engine with 5.3 to 1 compression ratio are given in the accompanying cut. The engine used in the recent race, however, had a 5.7 compression ratio and develops 460 b.-hp. at 2300, the speed at which it ran in the race. The fuel used in this case was 50 per cent benzol and 50 per cent aviation gasoline.

The engine has twelve cylinders with 4.5 in. bore. The stroke is 6 in. and the piston displacement 1145 cu. in. The aluminum blocks into which the steel cylinder liners are inserted give a rigid construction which it is difficult to obtain in an engine with separate cylinders. The angle of the V is 60 deg. There are two overhead camshafts for each cylinder block. One of these is driven directly by bevel gearing from crankshaft and the second shaft is driven by the first through a pair of spur gears.

Steel Cylinder Liners Employed

The steel sleeves are closed at the top and are screwed into the aluminum head casting. A stud, forged integrally with the steel liner, projects through the aluminum cylinder head. When the nut is drawn up close contact between liner and cylinder head is assured. The steel barrel of the cylinder is in direct contact with the jacket water. The sleeves fit snugly into the water jacket at the lower end and are provided with a flange under which a composition gasket makes a tight water joint.

There are two inlet and two exhaust valves per cylinder. They are of tulip shape, are all interchangeable, and seat

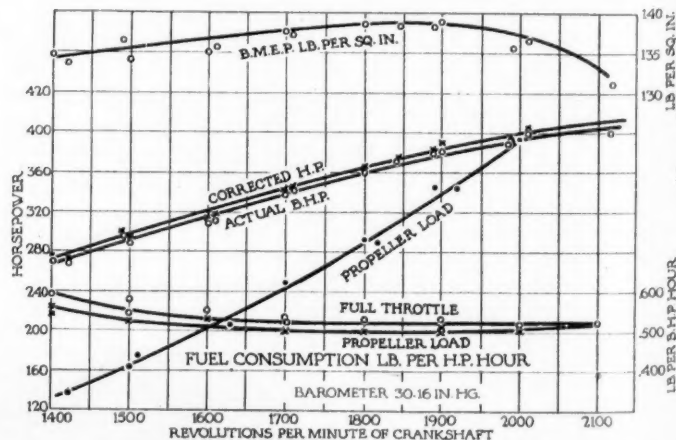
directly in the steel head of the liner. The size of the valves has been decreased by 0.04 in. to permit of their removal from the cylinder without removing the guide. The camshafts are mounted on the top of the cylinder heads on six aluminum brackets in which the shafts bear directly. The brackets are dowelled to the head and are made interchangeable so that no alignment, reaming or hand scraping is done in the manufacture. The bevel gears which drive the exhaust camshafts are internally splined with stub teeth cut on a Fellows gear shaper. This internally splined or toothed hub fits over the extended hub of the spur gear mounted on the exhaust camshaft. Because of the fact of the number of teeth on the spur gear differs from the number of teeth in the bevel gear a very fine adjustment is obtainable in timing by shifting the gear in relation to the shaft.

Each cam operates two valves through the medium of a T-shaped tappet yoke the stem of which reciprocates in a bushed hole in the cylinder head. By this type of construction all side thrust on the valve stems is eliminated.

At the rear end of the engine is fitted a gearcase which carries practically all the gearing used for operating the camshafts, magnetos, pumps and gun synchronizers. This gearcase has been redesigned to provide better accessibility and to make provision for mounting the Air Service gear type gasoline pump and generator drive. At present all gears are assembled to the shafts by using the stub-tooth spline construction referred to above. The tachometer drive is now taken off the left camshaft. All gears have stub-teeth. The magnetos are driven by a combination flexible disk and Oldham coupling. Two flanges used in this drive are provided with bolt holes so spaced about the same bolt circle as to enable a very close angular adjustment.

Seven Bearing Type Crankshaft

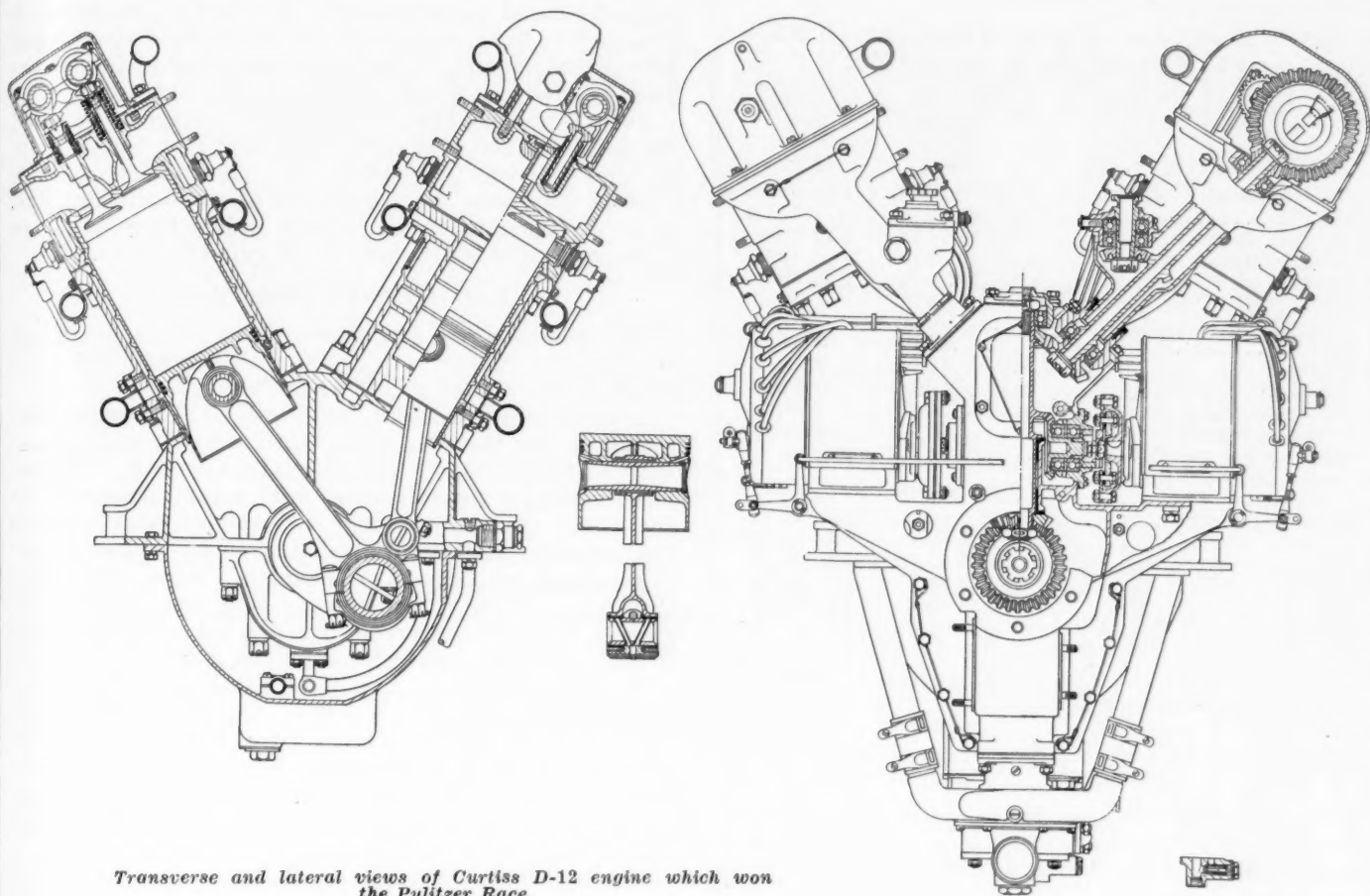
The crankshaft is Wyman-Gordon low chrome nickel steel forging and is of the conventional seven-bearing type which has been used heretofore. The lengths of the main



Power, fuel consumption, b.m.e.p. and propeller load curves of the Curtiss Model D-12 engine with 5.3 to 1 compression ratio

bearings have been altered so that only two sizes are now used. The center bearing is $1\frac{3}{4}$ in. long while the other bearings are all $1\frac{1}{2}$ in. The main bearings are 3 in. in diameter and the crankpins $2\frac{1}{2}$ in. as formerly. The crank cheeks are now $\frac{1}{4}$ in. wider than formerly but are elliptical in end view instead of rectangular. By these changes the shaft has been made stiffer although lighter than formerly. The practice of dividing the main bearing into two sections and placing the ball thrust between them is continued.

The upper half of the crankcase has been slightly short-



*Transverse and lateral views of Curtiss D-12 engine which won
the Pulitzer Race*

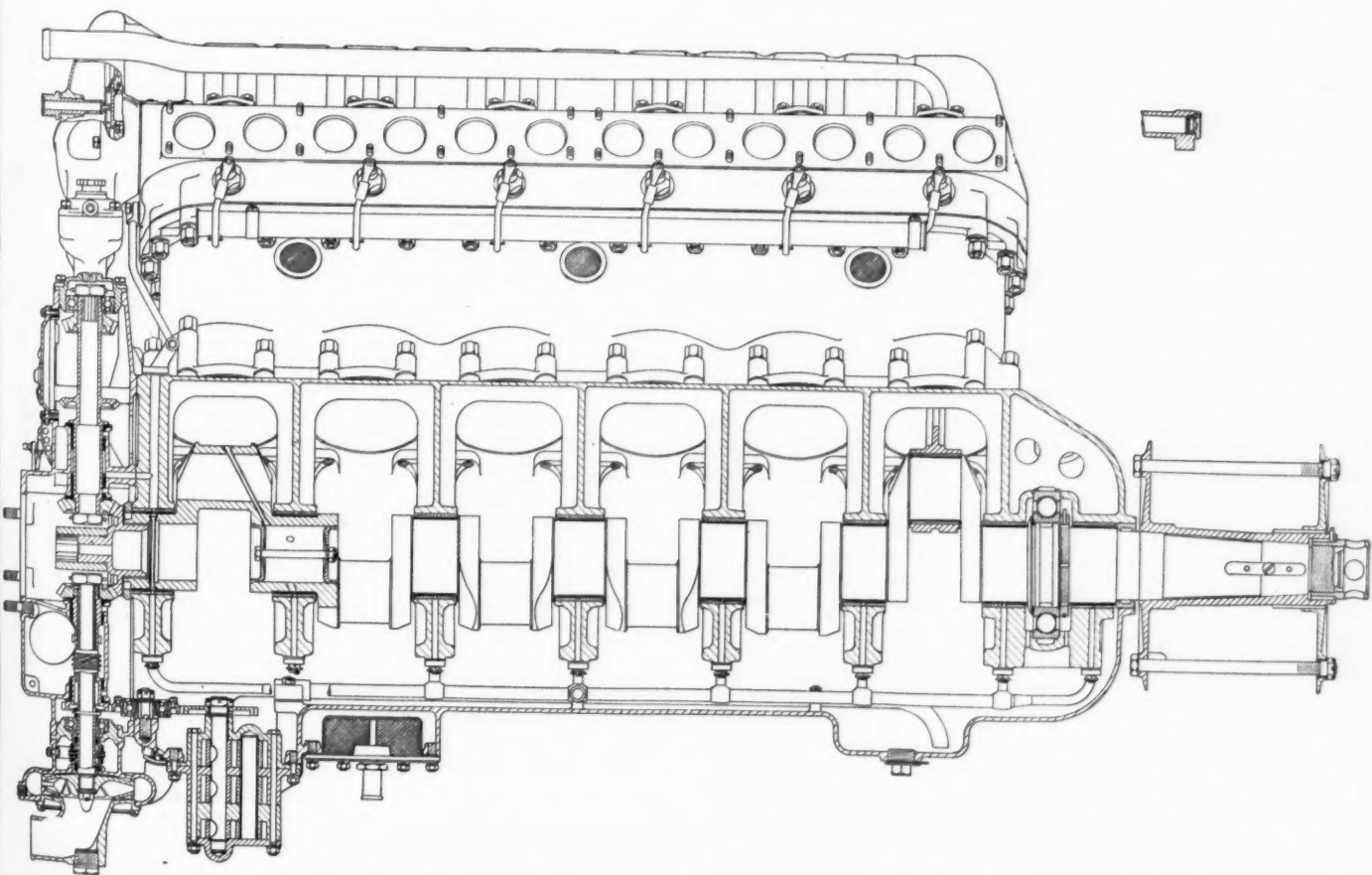


Table of Dimensions and Areas of Curtiss Planes Which Won Pulitzer Races in 1921 and 1922

	Curtiss-Navy Racer (1921)	Curtiss-Army Racer (1922)
Span (overall)	22 ft. 8 in.	19 ft. 0 in.
Length	21 ft. ½ in.	18 ft. 11 in.
Height	8 ft. 11 in.	7 ft. 10 in.
Length, upper panel.....	22 ft. 8 in.	19 ft.
Length, each lower panel.....	10 ft. 2¼ in.	8 ft. 10 in.
Chord (all wings)	48 in.	46 in.
Angle of incidence	0 deg.	0 deg.
Gap	48 in.	46½ in.
Stagger	15 in.	7½ in.
Dihedral (lower only)	2 deg.	0 deg.
Sweepback	None	None
Tread of wheels	60 in.	58½ in.
Upper wing panel	88.0 sq. ft. ¹	68.4 sq. ft. ²
Lower wing panels with ailerons	80.0 sq. ft.	62.74 sq. ft.
Total wing area	168.0 sq. ft.	138.0 sq. ft. ³
Ailerons	17.6 sq. ft.	9.25 sq. ft.
Horizontal stabilizer (2).....	12.6 sq. ft.	11.2 sq. ft.
Elevator (2)	9.2 sq. ft.	6.9 sq. ft.
Tail fin (1)	4.8 sq. ft.	4.9 sq. ft.
Rudder (1)	4.8 sq. ft.	4.9 sq. ft.

¹ Had no ailerons. ² Including ailerons. ³ Including stubs and landing gear fairing.

ened by removing the propeller end electric starter bosses but is otherwise practically unchanged. Duralumin forgings are now used instead of aluminum castings for the main bearing caps. The bearings are of bronze with babbitt linings held in place by countersunk screws. These bearings are bored to size in a boring mill and are not line reamed or scraped since the makers believe that this practice gives the best alignment securable. It also materially facilitates production.

The aluminum pistons have a ribbed head and the rings have been lowered to provide a wider top land and to make the rings all 3/32 in. wide. The piston pin floats both in the rod and in the bosses. It is held in place by snap rings of piano wire. The connecting rod assembly is unchanged. They are of articulated type, the short rod being forked over a boss on the master rod.

Three Separate Oil Pumps

The lower half of the crankcase has been entirely redesigned to eliminate the oil tank formerly built into it. At the same time the oil pump has been redesigned. There are now three separate oil pumps instead of three suction and two pressure pumps formerly used. The oil pumps are driven by spur gears from the lower vertical shaft. The middle gear of the train is mounted on an eccentric stud attached to the lower case, the arrangement being such that an easy adjustment for proper mesh can be made without special care being used to maintain exact center distances in machining.

One of the oil pumps draws oil from the front end of the crankcase and the other from the rear end, while the third delivers oil under pressure to all bearings on the crankshaft, camshafts, and to the plane bearings in the gearcase. All other bearings are fed by splash or by oil which runs back from the camshaft compartments. The average oil consumption is said not to exceed 0.015 lb. per b.-hp.-hr.

The water pump design is changed to provide a ball bearing in place of the plain bearing formerly used and a splined instead of a square shaft. The water pump is driven off the lower end of a vertical shaft at the rear of

the engine and is provided with easily adjusted glands to prevent oil and water leakage. An Alemite connection is arranged to force grease into the water gland since it has been found that it is easy to prevent leakage when the packing is kept soft with grease.

The water pump has a double shrouded type of impeller, the same as that used formerly except that the capacity has been slightly increased. The pump delivers water through manifolds to the lower end of each cylinder block. After passing through the cylinder jacket the water issues through manifolds attached to the cylinder heads.

Redesigned Propeller Hub

The propeller hub has been redesigned so as to use standard size Liberty bolts and bolt circle. The loose flange of the hub is a duralumin forging.

The engine is fitted with two Zenith U. S. 54 carbureters rebuilt to use throttles with shafts parallel with crankshaft and to provide a special mixture control. The two carbureters are interconnected with a cast aluminum air duct which draws air through a sheet aluminum air stack from outside the body of the plane. Two twelve-cylinder single-spark type Splitdorf magnetos, Model SS-12, are used for ignition. There are two plugs per cylinder, one on each side. One magneto fires the plugs on the intake side and the other those on the exhaust side.

The gasoline system consists of a Curtiss three-cylinder gasoline pump which feeds fuel directly to the carbureter. The fuel is fed through a relief valve to maintain constant pressure, an overflow being provided to take care of excess capacity. The pump is arranged to give positive priming and is oiled under pressure to prevent the leakage of fuel past its pistons.

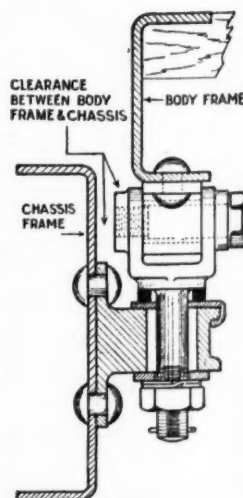
The engine weight is given as 715 lb. with propeller hub and water, or 671 lb. empty and without accessories.

New Body Anchoring System

TO prevent frame distortion from "racking" the bodywork and thus setting up creaks which develop later into rattles and cracked beading and panels, the Daimler Co., Coventry, England, utilize a system of anchoring the body to the chassis frame which permits of movement between the two.

The body is built up on a light pressed steel frame of channel section which is secured to the chassis at two points at the rear and at the front rests upon blocks of rubber attached to the chassis. The rear anchorages form hinges which enable the body to be lifted up at the front until it assumes an angle of approximately 45 deg., a feature obviously facilitating the inspection and adjustment of the transmission, etc.

The accompanying drawing shows one of the anchorages and indicates the amount of clearance allowed between the chassis frame and adjacent parts attached to the body frame. The bracket rivetted to the chassis has, it will be seen, a hole with considerable clearance for the vertical stem of the hinge fork, this being provided to permit of inadvertent variations from standard dimensions in the two frames.



Rear anchorage of Daimler bodies; section showing channel steel frame on which body is built up independently of the chassis frame.

Making Fin and Tube Type Radiator Cores

Tubes are drawn, inserted in and soldered to fins punched from sheet brass. Single sections are then assembled into one-piece cores. Single operator makes 9,000 ft. of tubing per day.

By Herbert Chase

ALTHOUGH fin and tube type radiators have been used for cooling automobile engines ever since the earliest types of cars were constructed, there have been many recent advances in the method of manufacturing radiator cores of this type. There are numerous different methods now followed in making these cores, and each manufacturer has a more or less characteristic type.

The type marketed by the Bush Mfg. Co. consists of a series of vertical sections containing from three to six rather flat vertical tubes arranged in a plane at right angles to the front of the radiator. The tubes are spaced on centers about 1 in. apart, and are forced through fins of sheet brass spaced from four to eight per inch of height. The fins are made from 0.005 in. ribbon, the edges of which are folded over so as not to present a knife edge at the front and rear of the radiator. The fins are pierced to fit closely over the tubes and the front edge of the fin is, in some cases, slotted at two points to provide recesses into which are fitted vertical strips which join the fins at the front edge. These strips give the front a square cellular appearance and serve also to strengthen the core.

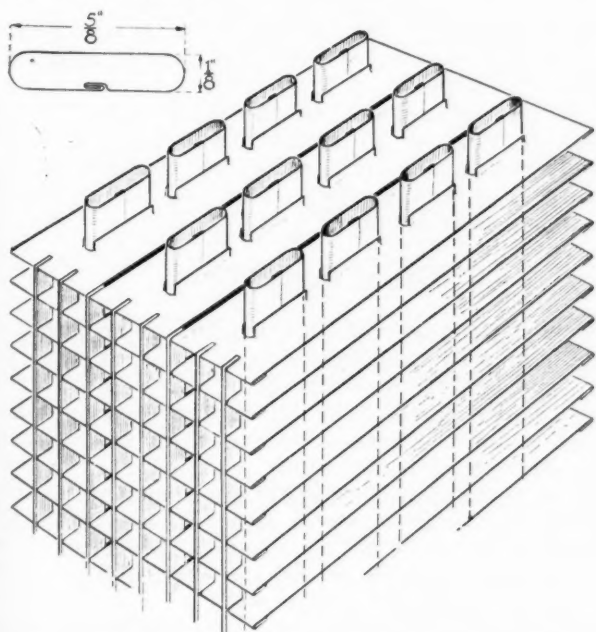


Fig. 1—Sketch of a portion of the Bush fin and tube core, showing section of the tube with double-locked seam

The separate vertical sections are 1 in. wide and are made of such length as to form a core of the desired height. The single sections are placed side by side in assembly to form a core of a width to fit the particular shell employed.

Each single section is dipped in solder before the final assembly so that the fins are securely soldered to the tubes, while all portions of the section including the inside and outside of the tube, as well as both sides of the fins, are coated with solder. After assembly of the sections to form the complete core, the latter is dipped in solder front and back in order to make it a single unit.

Manufacturing Operations

The first step in the manufacture is the formation of the tube, which has the section shown in Fig. 1. It will be noted that the seam is of the double-locked joint type. The tube is formed from brass ribbon 0.009 in. thick and 1 27/32 in. wide. This ribbon is pulled through a forming die on a conventional type of draw bench as shown in Fig. 2. The tube is formed with the lock joint in a single operation. It is made in sections 10 or more feet in length and is afterwards sawed off by a high-speed rotary saw to the desired length for the particular core.

The lubricant used in the drawing die is whale oil soap in water. A single experienced operator can make, on a single draw bench, from 500 to 600 lb. of tubing per 9-hr. day. Since the tube weighs 0.0575 lb. per ft. this is equivalent to about 9000 to 10,000 ft. of tubing per day.

The second operation is to saw off the tubes to the desired length. The tubes are then burred on each end and are then transferred to the tube pushing machine described below.

The brass ribbon used for the fins is 0.005 in. thick and of whatever width is necessary to form a core of the desired depth. The first operation on the ribbon is to draw it through a die which simply folds over the edges. The ribbon is fed off a spool, through the die and on to a second spool or pulley, which is driven by power. The spool of ribbon with folded edges is then transferred to a high speed punch in which the holes for the tubes are pierced and the ribbon cut off in 1-in. lengths, which form the individual fins. The metal in the holes is not cut away but is bent up to form a good surface for soldering to the tube. As each fin is cut off it is automatically placed in a loading jig in which the fins are spaced from four to eight per inch, according to the amount of cooling surface desired in the particular core.

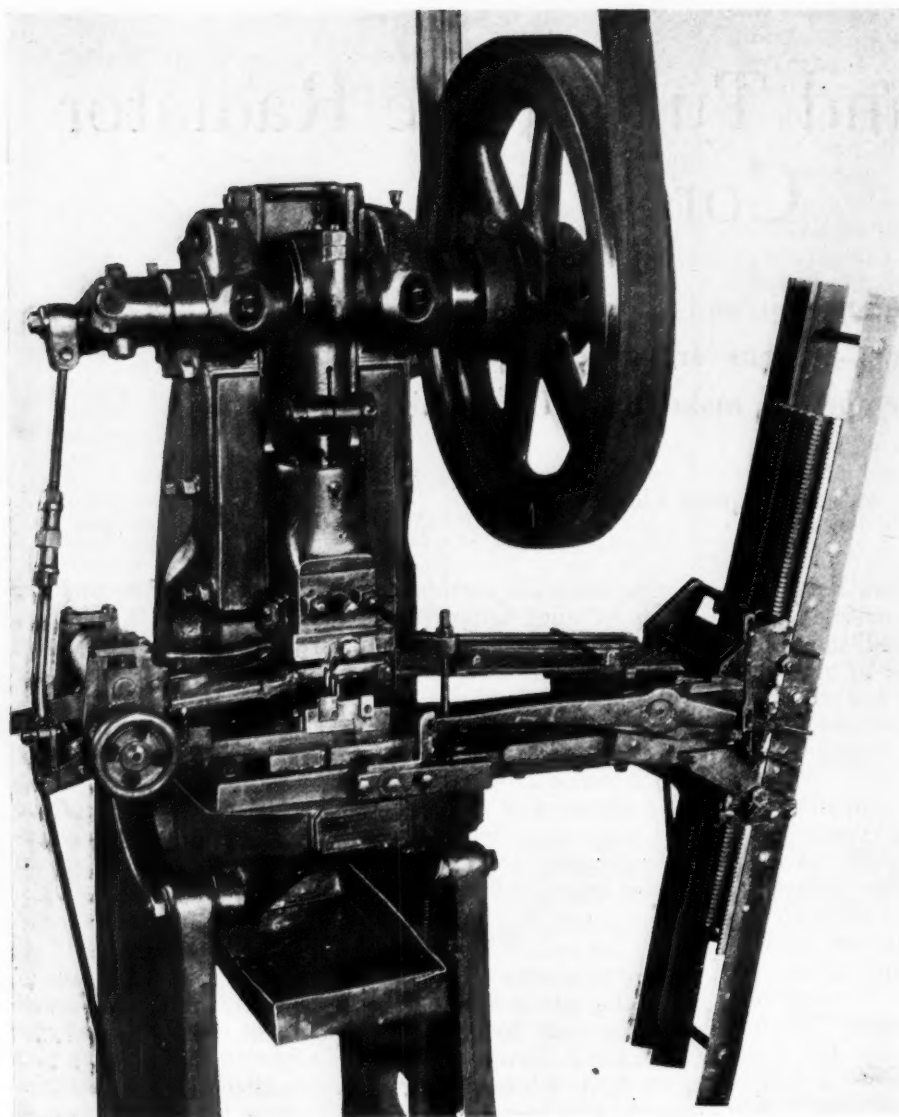


Fig. 3—The punch here shown pierces the holes in the fins, cuts the slots in their front edge, cuts the fins off to length and inserts them in the loading jig shown at the right

This automatic punching machine is capable of loading from thirty-six to forty jigs per hour. The machine is shown in Fig. 3. The unloaded jig is placed in position on a frame at one side of the machine and is automatically fed upward as the fins are loaded in it. When filled to the desired height it is removed by hand and placed in the tube pushing machine shown in Fig. 4. At the same time another empty jig is placed in the frame. During the time the second jig is being loaded the first jig in the tube pushing machine holds the fins while the tubes are put in place by the same operator who cares for the punch.

It will be noted that the tube pushing machine has a bench to which the loading jig is fastened. Under this bench is a hand crank carrying a ratchet wheel and a pinion. The latter meshes with a horizontal rack which slides in a track under the bench. A head attached to one end of the rack, as seen in the photograph, bears against the outer ends of the tubes, which are placed in position by the operator. Into the ends of the two outer tubes in the row are fitted tapered brass pilots, the function of which is to align the fins as the tubes are forced through. Motion of the crank in a clockwise direction moves the rack and forces the tubes through the fins, after which the section, with fins in place, is removed by hand and is ready to be sent to the dipping room,

while the jig is returned to the loading machine.

A single operator handles the punch and the tube pushing machine. He pushes one set of tubes through the fins in one jig while the other jig is being loaded in the punch. An operator can thus make from 36 to 40 sections per hour, depending upon the length of the sections.

These sections are dipped separately, first in a soldering flux, then in a bath of solder which tins them all over, including the interior of tube, thus soldering the fins to the tube as well as soldering the tube joint. This dipping is done by hand while the bath of solder is maintained at a correct temperature by adjustment of the gas flame.

Following the dipping operation the single sections are assembled in a frame on a table and separating strips of copper about 3/16 in. wide are inserted between sections. In some cases also, strips are placed in the slots in the front edge of the fin, which are cut at the same time the fins are pierced in the punching machine, referred to above. These strips are intended to give the front an appearance similar to that of a square cellular type core. When the strips have been inserted in the front the core is locked in a frame and turned over after which the strips between the single sections are inserted in the back face. When these strips are in place the core is placed on a surface plate where it is trued up. The front face is then dipped in flux and in a bath of solder, thus firmly securing the strips in place and locking the core together. The backface of the core is then dipped also.

Following the final dipping operation the core is transferred to a bench where the front face is filed off by hand to give a perfectly level front surface. The core then undergoes a hand straightening operation performed by hand by an operator who uses a multiple-pointed punch, which fits into the front cells and straightens them into parallel rows. This operation is for the sake of appearance only.

Fitting Header Plates

The next process in the manufacture is to punch out header plates from 20-gage bronze. This is done in a power punch through which the bronze ribbon of the desired width is fed. The punch simply pierces holes through which the ends of the tubes in the respective single sections project.

The next operation is to apply the header plates to the core and hand solder them in place. If any trimming is required on the core, as, for example, to cut off corners to conform to a particular shape of shell, this is done by hand before fitting the header plate.

In many cases cast radiator shells are machined and fitted in the Bush plant, or are formed from sheet metal, reinforced by the necessary castings, and assembled to the core. The completed radiator is then tested under

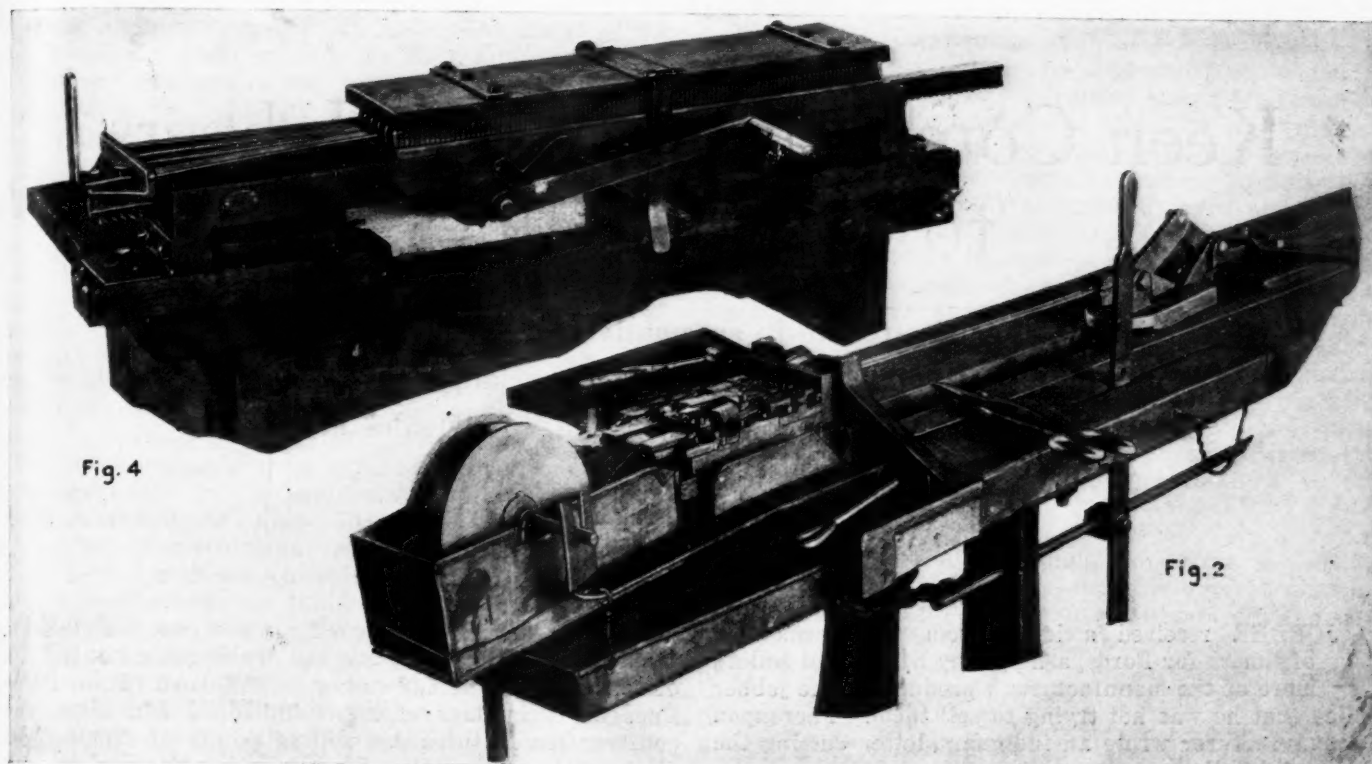


Fig. 2—Drawing the brass tube through a forming die. The brass ribbon used is 0.009 in. thick. The tube is formed in a single operation. Fig. 4—Pushing the tubes through the fins as they are held in the loading jig. This is a hand operation. A single operator performs this operation and cares for the punch shown in Fig. 3. While he is pushing the tubes through fins held in one jig, another jig is being loaded in the punch

water by applying an air pressure of 12 lb. or more as desired. If any leaks are found these are carefully repaired by hand before the core is passed. In case of

cores which are shipped without the shell a temporary box is soldered top and bottom to admit of the pressure testing operation, after which the box is removed.

Protection Against Cementation by a Brush-Applied Coating

MESSRS. Galibourg and Ballay describe in the *Revue de Metallurgie* a new process for protecting certain portions of pieces against carbon penetration in the cementing process. They use two parts by weight of copper dust and one part of emery dust together with sufficient solution of commercial sodium silicate to make a heavy paint. The coating obtained with this mixture is very adherent before it is heated, but readily drops off after cementation and quenching. The best plan is to prepare the mixture of copper dust and emery dust in advance and add the necessary amount of potassium silicate solution at the time the paint is wanted.

The paint should be prepared only a short time before it is to be applied. At first the silicate is added little by little, so as to obtain a thick paste, which is then brought to the necessary fluidity to obtain a smooth coating by means of the brush. If the mixture thickens while it is being applied it is thinned down by adding silicate solution.

Experience has shown that the coating will protect efficiently only parts that have been thoroughly cleansed of grease and of silicates. Cleansing in hot potash is entirely insufficient, as mineral oils show little tendency toward emulsification. The most efficient method of grease removal seems to be to pass the pieces to be treated through a furnace at about 930 deg., carefully avoiding raising to a red heat, as this would produce scale. Numerous tests made under these conditions and

covering thousands of pieces are said to have always given excellent results.

It requires a coating of from 0.020 to 0.030 in. thickness to protect against cementation to a depth of 0.040 in. If the coating is correctly applied its drying requires about 15 minutes. At the end of that time the pieces may be handled without risk. In any case the pieces may be put in the cementing boxes an hour after having been given the protective coating.

In cases where it is necessary to economize time or where, on account of the form of the parts to be protected, rapid drying is necessary (protection of projecting angles) the coating may be applied to the piece after it has been heated to from 160 to 190 deg.

Taking account only of the cost of the materials and making the test on a piece comprising equal areas to be cemented and to be protected, the two portions of the surface also being identical in form, the advantage remains with copper applied electrolytically. But if account is taken of the fact that painting with silicate permits of passing through four times as many pieces, by doing away with the attachment of the pieces before they are placed in the bath and the cost of installation and maintenance of the plating establishment, the advantage is largely in favor of painting with silicate.

It is quite evident that the choice of one or the other of these processes should depend upon the proportion of the surfaces to be cemented and to be protected.

Keen Competition Forces Jobbers to Restrict Lines

New trend gains strength in automotive equipment field. Salesmen must have popular lines on which to specialize. Some manufacturers also working in same direction. New sales methods.

By Neal G. Adair
Editor, *Motor World*

A JOBBER received a letter from a manufacturer of timers for Fords, asking why he was not selling more of the manufacturer's products. The jobber replied that he was not trying to sell them. Thereupon the manufacturer wrote an indignant letter cutting the jobber off his list.

The manufacturer was justified in cutting the jobber off. His mistake was in getting indignant. If the manufacturer had taken the trouble to investigate he would have learned that he should have taken the jobber off his wholesale list six months earlier. At that time the jobber decided to discontinue carrying a dozen lines of timers in favor of selling three lines, one high priced, one medium and one low. The indignant manufacturer's timer happened not to be one of the three.

This incident illustrates a trend in merchandising which is gaining strength every day in the automotive equipment field. Intensive competition is forcing jobbers to restrict their lines. Scattered gunfire from such a skirmishing line as a catalog containing seven or eight thousand items won't win to-day's battle on the dealer and garage front. The jobber must have a battery of Big Berthas and he is finding it in lines of leaders—a dozen or two dozen fast selling items with which his salesmen can batter down competition and then mop up with the secondary ammunition of general merchandise.

THE jobber's Big Berthas must be goods that his salesman can make a noise about, which imposes two requirements, first, that the goods must be highly salable, and, second, that the salesman must know the goods. The second requirement is largely responsible for the restriction of lines. A salesman cannot make much of an impression walking into a dealer's establishment and trying to sell him one of a dozen lines of timers or horns or even spark plugs. He cannot talk convincingly about any of them. He cannot tell the

dealer why any one is a good piece of merchandise or, what is more important, how the dealer can go at the job of selling it. If he has one or, at the most, two or three lines of each class of merchandise he can learn the construction features and selling points of all of them fairly well. He can open his conversation with the dealer by talking about items which he knows well, obtain an order or group of orders from his line of leaders and then, when he has maneuvered the dealer into a buying mood, work up a reasonable volume of pick-up orders from the pages of his catalog making up his second line of attack.

Not all jobbers by any means have reached or even approached this stage of semi-specialization but the number who are working along these lines is gaining every day. This trend among jobbers is meeting co-operation in some manufacturing circles, resistance in others.

THE jobber who is cutting his timer line, for instance, down to three would like to have fewer competing jobbers handling the same timers. He feels that if he is going to con-

centrate his timer sales activities on three lines the manufacturers of those lines should co-operate by broadening his market, and they can do this only by cutting down the competition against his work as a distributor. He would like to see, perhaps, two or three of the twenty odd jobbers in his territory handling these timers, another group of jobbers, another group of timers, and so on, eliminating a condition under which perhaps fifteen to twenty jobber salesmen in a single week approach the same group of dealers with the same list of timers. Some manufacturers are falling in with this line of thought. In fact, some are urging it upon jobbers, with the result that in quite a number of lines manufacturers are gradually but materially cutting down their jobber representation in given territories.

On the face of it the two movements—jobbers restricting their lines and manufacturers cutting down mul-

NCESSITY for operating along sound economic lines is bringing a distinct change in methods of merchandising automotive equipment. It is no longer possible to get satisfactory results with scattered sales effort. Concentration is needed and the necessity is recognized.

* * *

In this article Neal G. Adair, editor of *Motor World*, points out the trend of merchandising in this field. He gives incidents by way of comparing the effectiveness of different sales methods and tells some of the problems that the automotive equipment manufacturer is up against.

tiplicity of jobber representation—should assist in the much-needed process of reducing distribution costs.

Another instance, rather, a pair of them, will serve to illustrate the workings of the present day trend in the equipment field.

A JOBBER who had been carrying several lines of brake lining threw out all but one six months ago. In the half year period he has sold twice as much brake lining as in any similar time in the history of his business. It didn't just happen, of course. He pushed the sale of the one brake lining, as he could not promote three or four lines. His salesmen were able to study up on the one line, talk about it as the best line and turn convincing sales arguments into sales.

The other instance is of a manufacturer, one of the most aggressive in the equipment field, whose factory makes a replacement unit. In a wide territory he cut his jobber representation from five to two. Over a year's period accurate check was kept on all the company's products going into that field, and the two jobbers gave him more distribution than the five ever had. When it is noted that these two jobbers had cut their lines of this class of product from six or seven to two or three the full import of what had taken place is seen. The manufacturer did not eliminate competition on his line in the territory. Rather, he intensified it by making it more worth the while of his wholesale representatives to push his goods. Nor did the jobbers give the manufacturer a monopoly of their services. They simply fitted themselves for better merchandising of the class of merchandise in question by restricting the number of lines.

A NOTHER manufacturer told a group of jobbers recently that he hoped within two or three years to reduce the number of jobbers on his books from 500 or thereabouts to a little more than 200. He gave it as his opinion that a manufacturer with a salable line of merchandise can cut his jobber list in half, using discretion, without losing sales volume.

Apparently, judging from the hundreds of names on the wholesale lists of some manufacturers, there are still sales managers who think that representation spells distribution. More and more of them, however, are learning their mistake. They are discovering that shipping a jobber a bill of goods doesn't sell them, and that a jobber who places only small and occasional orders is not a good customer, for two reasons. The first is that he is not giving the manufacturer distribution of his product in the territory and the second and more important reason is that he is not getting a frequent turnover of merchandise and so is not a good credit risk for the manufacturer.

NEW manufacturers coming into the equipment field cannot always get representation by the strongest jobbers, nor can they get individual jobbers to push their lines as vigorously as they will push tried and proven merchandise. They are forced to an extent to seek distribution through numerical strength of representation. But it is significant that some of the older and apparently more successful manufacturers are supporting and in some cases leading the movement among the jobbers to intensify selling by lopping off some of the outer fringes of competition. Just as the jobber can work more efficiently selling a restricted line of merchandise, so can the manufacturer get better results, particularly through his field organization, working with smaller groups of jobbers.

The automotive equipment business necessarily is younger than the automobile industry from which it gets its living, and it still has many straggling features. The trend toward centralization of selling effort may be regarded as one of the reforms developing with age. This movement, aside from lightening burdens and tending to assure profits of manufacturers and wholesalers, may gradually influence lower retail prices through the process of reduced distributing costs. It is not difficult to understand why an article which cost the manufacturer \$1.85 must take \$10 out of the consumer's pocket after one has seen twenty jobber salesmen, in a day, calling on a garageman on the outskirts of one of our eastern cities and, added to that spectacle, has visualized the vast army of manufacturers' salesmen and missionary men working continually on the many thousands of wholesalers and retailers in the equipment field.

BUT the young and struggling industry is getting steadier on its feet. Through its several associations and its group meetings of manufacturers and jobbers it is learning more about the laws of supply and demand. The manufacturers' inclination toward limitation of jobbers, together with the jobbers' leaning toward curtailment of lines, seems to be a move in the direction of operation along more soundly economic lines. Add to this the additional tendency of jobbers to restrict territory and so cultivate it more intelligently and we find much that the manufacturer, veteran or novice, needs to keep closely under his eye in the automotive equipment field.

American Car Exports to South Africa Show Increase

PASSENGER car imports into the Union of South Africa for the first half of 1922 were very good, considering the general economic conditions that have prevailed since the first of the year. Whereas in the whole year 1921 only 802 American passenger cars were imported, 854 were imported in the first six months of 1922, and 421 of them in May and June.

Imports of Canadian cars in the first six months of this year were 959 compared with 1010 in all of last year. Combining the two, we find that 94.03 per cent of the entire imports were of American origin, as compared with 87 per cent in 1921.

The United Kingdom was the second largest exporter to this market, the six months total being 59 machines of a value of £27,279. The total number of passenger cars from all sources imported in January-June, 1922, was 1928, valued at \$373,047.

France is the only other country that has any particular share in the present trade of South Africa. Thirty cars were imported up to July 1 as compared with 34 last year. As before, practically all are Renaults. Germany sent in only 14 cars.

IF the American motorcycle exporter would compete successfully in the Great Britain field, he must confine himself largely to models of 2.75 and 2.50 hp. at popular prices, rather than those which have been shipped over during the past three or four years of 3½ hp. The current demand for motorcycles is for the lighter models. Side car machines of 4.5 and 5 hp. models, at prices from £75 to £100, are reported as the best sellers, according to advices to the automotive division of the U. S. Department of Commerce.

American Exports of Cars, Trucks, Tires and Aircraft

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS
	Up to \$800		\$800 to \$2000		\$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons		Over 2½ tons		
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	
Europe													
Austria.....													\$600
Azores and Madeira Islands.....													448
Belgium.....	438	\$112,035	19	\$22,156	2	\$4,014	371	\$110,322	1	\$826			31,478
Bulgaria.....													80
Czechoslovakia.....													103
Denmark.....	39	24,834	13	14,629					1	1,320	1	2,224	167,468
Estonia.....													
Finland.....									1	3,200			403
France.....	11	6,745	9	10,535	5	13,841			1	1,186	1	1,983	102,408
Germany.....			1	1,000									796
Gibraltar.....			1	1,638									105
Greece.....	4	2,800	1	1,918									8,502
Hungary.....	1	400											
Iceland and Faroe Islands.....													
Italy.....			1	1,512									400
Malta, Gozo and Cyprus Islands.....	6	2,150											2,025
Netherlands.....	17	9,707	18	20,640	1	3,577			1	2,460			190
Norway.....	76	23,526	8	8,536			15	3,515					6,331
Poland and Danzig.....			6	7,500									11,167
Portugal.....			8	8,749									10
Roumania.....					1	3,870			2	3,766			1,709
Russia in Europe.....	60	35,160					40	18,400					2,192
Spain.....	216	72,213	128	149,699	25	71,175	2	2,064					6,043
Sweden.....	50	36,950	42	44,851									436,246
Switzerland.....	12	5,668	12	11,539	2	6,021							25,815
Turkey in Europe.....	1	586	2	1,840									6,010
Ukraine.....													2,635
England.....	514	276,239	94	104,478	3	11,150	53	41,925	77	62,099			414
Scotland.....			1	1,500									430,685
Ireland.....	2	775	2	1,943									150
Yugoslavia, Albania, etc.....													6,821
North and South America													
Bermuda.....													1,121
British Honduras.....													45
Canada.....	425	238,355	433	448,800	49	165,120	39	28,648	87	81,855	28	77,346	769,950
Costa Rica.....	2	686	1	1,360									12
Guatemala.....			2	2,335					1	1,214			1,486
Honduras.....	3	1,241	1	917					3	3,472			910
Nicaragua.....													2,081
Panama.....	10	5,288	4	4,128									125
Salvador.....													4,719
Mexico.....	530	224,275	142	154,751	26	62,163	110	47,516	13	19,067	10	25,434	1,196
Miquelon and St. Pierre Islands.....													76,012
Newfoundland and Labrador.....			2	2,603									32
Barbados.....							1	404					1,261
Jamaica.....	39	22,002	5	4,719			18	7,906	6	6,592			2,049
Trinidad and Tobago.....	14	6,656											11,587
Other British West Indies.....	9	3,220	2	1,986			2	504			2	4,381	6,887
Cuba.....	103	41,026	9	12,125	18	49,191	31	11,001	6	6,257			2,710
Dominican Republic.....	10	3,999	9	12,261	2	5,384	2	808	1	1,697			30,643
Dutch West Indies.....	1	358											13,873
French West Indies.....	2	829											1,275
Haiti.....	4	2,964	1	900									902
United States.....													3,010
Virgin Islands of U. S.....													
Argentina.....	32	23,812	96	101,053	7	17,105							780
Bolivia.....													85,682
Brazil.....	135	51,108	34	40,071	9	24,642					3	12,684	886
Chile.....			1	1,950									80,050
Colombia.....	10	5,172	8	8,761	1	2,989							6,912
Ecuador.....											1	2,078	6,201
British Guiana.....			1	880									585
Dutch Guiana.....							1	325					1,175
Paraguay.....													700
Peru.....					2	16,025	20	8,080					87
Uruguay.....	80	22,563	13	15,678	4	11,413	40	9,435					6,080
Venezuela.....	16	6,234	8	10,560	5	10,484	2	808					11,140
Asia													
Aden.....													4,861
Ceylon.....	8	4,540	2	2,955									125
China.....	54	34,764	19	18,479									520
Chosen.....	2	956	7	8,106									8,944
British India.....	80	53,061	8	8,508	2	4,008	5	4,032	5	5,061			
Straits Settlements.....			6	5,451									14,950
Java and Madura.....	30	22,500	21	21,468									4,505
Other Dutch East Indies.....													9,660
French Indo China.....													1,431
Hejaz, Arabia and Mesopotamia.....	5	3,888											54
Far Eastern Republic.....													326
Hongkong.....	1	750	3	2,525									88
Japan.....	2	1,360	15	15,778					5	11,838	2	5,369	427
Palestine and Syria.....	73	28,555	11	13,872									46,853
Persia.....													16,820
Philippine Islands.....	50	25,559	10	13,291	4	10,765			2	2,112			215
Greece in Asia.....	10	3,920											15,541
Turkey in Asia.....	6	2,318											178
Siam.....											1	1,800	
Oceania													
Australia.....	405	257,265	300	324,879	14	31,314	18	16,226	147	100,311			1,174
New Zealand.....	100	69,341	402	84,193	2	5,985			10	19,678	6	11,453	91,409
Other British Oceania.....											10	23,036	27,655
French Oceania.....	2	1,100											418
Other Oceania.....													147
Africa													
Belgian Congo.....	6	1,958											1,170
British West Africa.....	10	5,580	16	17,968			12	9,000	1	1,224			188
British South Africa.....	70	50,907	56	56,606	2	4,442							10,764
British East Africa.....	11	5,346	1	970							1	1,143	16,710
Canary Islands.....	6	2,830	9	11,176			4	1,616					768
Algeria and Tunis.....	14	5,354					6	2,185					8,259
Other French Africa.....	7	2,901											
Egypt.....	41	16,397	1	1,000			4	1,616					4,321
Liberia.....							1	500					1,065
Morocco.....	24	11,184	1	1,500									3
Portuguese East Africa.....	3	2,308											4,119
Other Portuguese Africa.....	34	14,427					30	13,137					126
Spanish Africa.....	5	3,750											267
Fiji Islands.....													1,482
Total.....	3,931	\$1,902,395	2,026	\$1,849,226	186	\$534,678	827	\$339,973	369	\$335,235	66	\$168,931	\$2,678,941

for August, 1922

Canadian Exports

ELECTRIC PASSENGER CARS AND TRUCKS		TIRES						PASSENGER CARS		MOTOR TRUCKS		PARTS	COUNTRIES		
No.	Value	Casings		Inner		Solid		No.	Value	No.	Value	Value			
		No.	Value	No.	Value	No.	Value								
2	\$2,900	8	\$153										Europe		
		574	7,805	756	\$1,175			22	\$16,509			\$543	Austria		
													Azores and Madeira Islands		
													Belgium		
													Bulgaria		
		2,406	33,283	2,438	5,864	212	\$6,035	3	3,790			78	Czechoslovakia		
		241	4,941	134	342	25	608	1	1,346				Denmark		
		1,191	24,937	93	375	3	68						Estonia		
		28	446	3	19								Finland		
													France		
		767	9,573	595	967								Germany		
													Gibraltar		
													Greece		
		94	1,445	82	161	8	168							Hungary	
		681	9,064	1,137	4,292			2	2,044					Iceland and Faroe Islands	
		262	2,961	137	249			3	2,224					Italy	
		734	11,659	887	2,097	30	685	47	34,825				194	Malta, Gozo and Cyprus Islands	
		1,821	35,790	1,093	2,411	16	707						356	Netherlands	
														Norway	
		287	3,678	20	38			6	8,172				13	Poland and Danzig	
		285	5,572	49	111									Portugal	
														Roumania	
		1,996	30,155	1,062	2,279	515	16,898	28	23,113					Russia in Europe	
		1,967	28,845	2,351	5,498	12	355	16	7,516				226	Spain	
		150	1,621	100	100								87	Sweden	
		273	2,876	77	123			1	1,362					Switzerland	
														Turkey in Europe	
		26,382	299,159	25,043	38,713	999	19,767	923	623,388				49,815	Ukraine	
		125	1,339	40	54									England	
		361	4,325	85	163									Scotland	
		639	9,855	560	1,208									Ireland	
														Yugoslavia, Albania, etc.	
														North and South America	
				2	18	8	51								Bermuda
				2,871	39,936	3,133	4,876	153	6,408						British Honduras
				57	1,145	32	64								Canada
				71	1,692	67	155								Costa Rica
				76	2,284	70	266	38	1,461						Guatemala
				23	428	56	123								Honduras
				401	5,983	246	430	14	350						Nicaragua
		18	273	24	54	8	240						Panama		
		12,806	130,888	16,009	27,380	187	5,453	16	19,875				Salvador		
													Mexico		
		99	2,079	125	248	6	111	1	982	1	\$510	535	Miquelon and St. Pierre Islands		
		56	640	15	27								Newfoundland and Labrador		
		627	8,817	1,164	1,908	81	2,301						Barbados		
		187	2,462	181	393	2	84						Jamaica		
		81	1,022	37	77	2	50	7	5,656				Trinidad and Tobago		
		6,030	79,681	9,991	16,067	590	16,944						Other British West Indies		
		1,270	17,187	1,633	2,818	153	4,058						Cuba		
		70	762	77	128	2	32						Dominican Republic		
		146	1,409	156	264	3	79	9	6,601				Dutch West Indies		
		207	2,272	305	513								French West Indies		
								15	6,020				Haiti		
		22	282	18	38								United States		
		4,625	42,006	7,680	12,287	134	1,980	27	20,853				Virgin Islands of U. S.		
		72	1,439	47	105	6	184						Argentina		
		3,796	50,677	941	1,391	219	4,794	26	17,097				Bolivia		
		674	9,632	382	995	13	364						Brazil		
		347	7,094	435	1,002	3	84						Chile		
		151	2,898	164	346								Colombia		
		94	870	159	242			3	2,192				Ecuador		
		339	3,403	436	856			3	1,254				British Guiana		
													Dutch Guiana		
		362	7,169	246	449	18	353						Paraguay		
		1,001	13,790	270	429			8	5,488				Peru		
		238	4,201	398	824			8	3,718				Uruguay		
													Venezuela		
		1	9	26	50			5	2,290				Asia		
		194	3,074	37	75			59	25,924				Aden		
		298	6,034	353	794	64	1,703	10	8,557				Ceylon		
		338	1,668	602	1,729								China		
		747	9,404	643	1,585	142	3,086	208	96,447	12	5,208	15,330	Chosen		
		712	9,118	876	1,676	104	2,212						British India		
		852	11,596	445	901	336	11,070						Straits Settlements		
		176	2,094	166	409	32	860	39	16,446				Java and Madura		
		80	1,198	60	180								Other Dutch East Indies		
		146	1,981	254	743								French Indo China		
													Hejaz, Arabia and Mesopotamia		
													Far Eastern Republic		
		17	205	12	18								Hongkong		
		1,111	16,919	56	84	48	1,066	15	12,914				Japan		
		959	11,740	949	1,878	30	794						Palestine and Syria		
													Persia		
		5,349	63,391	4,822	9,872	103	2,613						Philippine Islands		
													Greece in Asia		
													Turkey in Asia		
								3	1,269				Siam		
													Oceania		
		5,157	55,402	548	995	186	6,154	811	399,406	120	52,080	31,663	Australia		
		4,166	59,584	2,370	4,137	201	6,313	289	146,890			19,773	New Zealand		
		32	459	30	60								Other British Oceania		
		11	182	6	17	2	64						French Oceania		
		34	294	33	58	2	44						Other Oceania		
													Africa		
		351	6,481	336	815	10	300						Belgian Congo		
		3,394	37,857	2,448	3,548	4	93	80	50,138				British West Africa		
		410	4,689	276	596			4	1,603				British South Africa		
		610	7,625	331	543	54	1,071	1	1,447				British East Africa		
		272	4,165	125	234								Canary Islands		
													Algeria and Tunis		
		331	3,017	396	677			10	4,480				Other French Africa		
		4	45	4	6								Egypt		
		4	101	4	9								Liberia		
													Morocco		
		93	1,103	12	12								Portuguese East Africa		
		115	1,570	39	88	140	2,955	1	444				Other Portuguese Africa		
													Spanish Africa		
													Fiji Islands		
4	\$7,456	104,835	\$1,292,926	97,469	\$172,834	4,901	\$131,019	2,710	\$1,582,280	133	\$57,798	\$133,582			



The FORUM



Rail Car Field Demands Specialized Activity

Service Truck executive favors anti-friction bearing in rail cars. Market limited, but demand exists for right product.

Editor, AUTOMOTIVE INDUSTRIES:

We regret that we consider it necessary to go on record as being entirely out of sympathy with the article entitled "Why Railroads Don't Buy More Rail Cars," written by Donald A. Hampson.

Mr. Hampson starts this paper with some very good statements regarding the necessity for combining railroad and motor truck practice in gasoline cars for railroad service.

Thereafter, however, he strays into two very serious errors: one of them in assuming that no attempt has been made to combine railroad and automotive experience, and in the other case in allowing his paper to degenerate into an argument in favor of plain brass bearings, which the railroad men themselves will admit are the cause of the greater part of their operating delays in freight trains, etc.

As set out by Mr. Hampson, it is indeed very important that the manufacturer of motor coaches should combine railroad and automotive experience. The engineer must choose carefully the good features of railroad practice, as well as motor truck and automotive practice, which are adaptable to his particular problem. For instance, the use of eight wheels under a car is not the result of any accident, but is based on real necessity arising from the operating conditions. The use of four-wheel pivotal trucks and of swing motion bolsters can be traced to a real need on the part of the railroad. It therefore seems obvious that any combination of automotive and railroad practice which seeks to offer a real solution of the problem in question should not overlook these particular essentials.

Plain vs. Anti-Friction Bearings

As regards the merits of plain and anti-friction bearing, I have no doubt that satisfactory automotive equipment can be built on either of these types of bearings. With the light weight per wheel which is encountered in gasoline motor coaches, however, the roller bearing packed in grease can be used with much less attention and much less trouble than any other bearing, including the plain, old-fashioned brass. Furthermore, it has been shown that all speeds below about 30 miles per hour, the resistance due to plain bearings is considerably in excess of that on anti-friction bearings. It therefore seems obvious that in gasoline propelled equipment, where the normal operating speed is usually around 30 miles an hour, anti-friction bearings would have a considerable advantage from the standpoint of acceleration and economy.

Finally we must point out that Mr. Hampson's title that the railroads are not buying motor coaches is false. Our experience indicates that if they are offered something that will really fit their needs, they will not hesitate to buy,

and in good quantity, too. In closing, we want to point out one further thing. The field for cars of this type is relatively limited. The production for a year will be small as compared to motor truck or automotive practice. This is not a field, therefore, which should appeal to the large quantity producer, but will be made the field for specializing by the companies devoted exclusively to this work.

CHARLES GUERNSEY,

General Manager, Railroad Division, Service Motor Truck Co.

Editor, AUTOMOTIVE INDUSTRIES:

The article entitled "Why Railroads Don't Buy More Rail Cars," by Donald A. Hampson, published in your issue of September 21, 1922, has been read with much interest. His summary of the present strategical situation as between the automotive industry and the railroads is in general accurate. Perhaps he is inclined to criticize a little too severely the conservatism of the railroad engineers, in view of the remarkable record for efficiency and safe operation, which stands as a tribute to their policy.

Undoubtedly, the solution of the problem of adapting the rail car to the real needs of the railroads lies in a compromise. Experience has conclusively shown that the broad field of application is covered neither by the heavy motor coach of the early days, nor the standard motor truck chassis fitted with flanged wheels and a bus body. The former fails from an economic point of view, the latter from an engineering point of view.

Our experience with both the railroads and the rail car builders, leads us, however, to differ with Mr. Hampson in the detail of his suggested compromise. His proposed pedestal mount is perhaps justified according to the psychology of salesmanship, but the problem is fundamentally and ultimately an engineering one. In this latter respect the pedestal mount is far from being a panacea for all those ills which the light types of rail car have developed in service.

In order to justify the retrogression to the plain type of axle bearings, Mr. Hampson refers superficially to antiquated comparative tests between plain and anti-friction journal bearings. He further draws his parallel with an "overloaded freight car," completely ignoring the vast disparity in the character of the service. Surely the railroads are not seeking to duplicate the proverbial rough riding qualities of a freight car in their most modern passenger equipment. The shock and vibration in operation is one of the most severe indictments against the present light rail car.

It is now definitely known that there is a very appre-

cial saving in power, resulting from the use of anti-friction axle bearings in rail vehicles. These conclusions are based on exhaustive tests conducted by the Swedish State Railways over a period of eight years. The incongruous results of early tests have been definitely traced to inherent defects in the primitive types of mounting employed; which through their enforced constraint on the axles introduced indefinite and uncontrollable variables aside from the friction of the bearings themselves. The demonstration of this fact leads to conclusions in complete harmony with the experience derived in the application of anti-friction bearings in all other mechanical fields. There is no logical reason for assuming that a ball or roller bearing has desirable anti-friction qualities, when applied to a transmission, which it loses completely when properly installed in a correctly designed journal.

In regard to the durability of anti-friction bearings, under the very serious conditions of metallic impact, and unsprung wheel and axle loads, we have only to refer to the results obtained in tests on the actual steam equipment, in fast passenger service. The fact is not generally known that the Swedish State Railways now have a large part of their standard equipment fitted with anti-friction journal bearings. Tests are also in progress in the United States with this same type of roller bearing, installed on standard steel passenger equipment in

express service. The results of these tests to date show conclusively that the life of such bearings is many times greater than the average of 35,000 miles, which is typical of plain bearings in equivalent service. The progressive railroads of both Europe and this country have shown a remarkable interest in the results of these tests and have found in them the answer to both the question of power saving and that of superior durability.

Since the anti-friction bearing has established its field and possibilities in regular steam train service, why ignore its multiple benefits in less severe service of rail car operations? Such a policy is poor salesmanship and worse engineering.

In conclusion we do agree with Mr. Hampson as to the simplification resulting from application of the pedestal type of mounting. Such a design, providing the latest railroad development of self-aligning roller bearings, applied to a live axle having lateral freedom, is an excellent solution of the journal problem. The further advance in assuring ease and comfort of riding must provide, in some way, a greater degree for transverse flexibility of the spring suspension. This is one of the notable differences in the character of the service exacted from rail vehicles over those employed on highways.

H. E. BRUNNER,
Chief Engineer,
S K F Industries, Inc.

Steering Gear Troubles Analyzed

Easy handling possible with proper steering gear construction.

Prominent engineers give reasons for present difficulties.

Editor, AUTOMOTIVE INDUSTRIES:

The items indicated in your recent article as having an effect on the question of steering are all of importance. With regard to castor action, we have found that increasing the ease of steering has made it increasingly important to reduce the castor effect almost to a minimum, in order to prevent front wheel wobble. With proper attention to the details of construction, both in manufacture and assembly, there is no reason why the largest truck should not be handled with perfect ease.

B. B. BACHMAN, Chief Engineer, The Autocar Company.

Editor, AUTOMOTIVE INDUSTRIES:

We have had few difficulties with steering gears, but do not think this would be the case if we put the steering gears into our cars as we receive them. We have to rebuild quite a number of them. In other words, we think the steering gear manufacturers are to a certain extent afflicted with one of the ailments from which we all suffer; that is, poor workmanship.

We believe, however, that the worm and sector steering is certainly the easiest.

With a large steering wheel, with the axle pitched to the proper degree sufficient leverage on the steering arm and with a worm and sector gear, steering should be very easy, and at the same time sufficiently fast to turn corners at a comparatively high speed.

We all know the objection to most of the worm and sector gears is the poor arrangement or rather lack of facilities to a great extent for taking up the wear even with eccentric bushings, which is a very poor proposition,

and there is bound to be lost motion on the sector and also wear on both the worm and the sector.

W. G. WALL, Chief Engineer, National Motor Car & Vehicle Corp.

Editor, AUTOMOTIVE INDUSTRIES:

It has been our experience that all parts of the steering linkage must be free and in good alignment, that the axle must have the proper angle and the toe-in of the wheels must be right to give easy steering. The big factor, however, is the properly designed and manufactured steering gear.

We pay a good deal of attention to these points and we have an inspection test on our steering gears determining the pounds pull necessary to operate the gear.

We also lap the ball ends of the reach rods, as we have found that there is too much friction on a turned ball seat.

Lubrication has a great deal to do with easy steering. The king pin must be properly lubricated as well as all other connections. To cover this point on our king pin we use oil and the design is such that this oil cannot escape, therefore, does not have to have attention very often. The Empress Bowen system is used on the other connections.

C. E. JEFFERS, Chief Engineer, Nordyke & Marmon Co.

Editor, AUTOMOTIVE INDUSTRIES:

The statements made by steering gear manufacturers are undoubtedly true in some cases. I found that the toe-in as specified by nearly all manufacturers has practically no effect on the stiffness of the steering.

Outside of rough workmanship of steering gears, I find most of the causes of stiff steering on new cars is due to stiff assembly of the front axle. Car manufacturers have a tendency to assemble the front axle rather snug so as to give the axle longer life and prevent rattles and loose bearings after a few thousand miles. This particularly refers to axles with plain bearings in the knuckle pins and tie-rods. However, such axles will loosen up after a few hundred miles due to the road shocks, and after which the steering will be found usually quite easy.

I have also found that sometimes the steering gear mounting on the frame as well as the steering connections are quite flexible, which allows too much spring in the whole steering mechanism and makes the steering gear seem hard. This is specially noticeable when the steering gear is mounted away from the frame or where the steering gear is mounted on a part of the frame not braced against twisting of the channel.

I believe though that the greatest blame of hard steering rests with the public. The public will insist on riding with soft tires, which increases the stiffness of the steering very much and will not lubricate the front axle and steering mechanism as instructed. I have found very often that by lubricating the front axle only, it will bring a stiff steering car back to normal, although the steering gear was blamed for the fault.

VICTOR JAUTSCH, Chief Engineer, Earl Motors.

Editor, AUTOMOTIVE INDUSTRIES:

In our experience steering difficulty is caused almost entirely by improper alignment.

On the other hand, steering gear manufacturers have had considerable difficulty in eliminating rattles from their steering gears, and as a result they use various types of anti-rattling packings, which packings are invariably adjusted too tight. This difficulty could be eliminated if the steering gear manufacturer would agree to run his steering gears in so as to reduce the friction in the packings.

It is the practice of some steering gear makers to weigh the torque at the rim of the steering wheel, but the maximum torque they have fixed upon is entirely too high to produce an easy steering car. The hardened worm and segment or worm and worm wheel type of steering gear will practically lock under loads that would be produced in steering a car in sand or with partially deflated tires. In

other words, the load which this type of gear of present design will carry without producing excessive friction in itself is very limited.

Excessive friction, due to misalignment of front axle part, could be eliminated by the car assembler by testing the alignment when the axle is carrying its full load. This could be accomplished by placing the front wheels on ball bearing plates or suspending the car from the rims of the front wheels, and fixing upon a maximum torque to turn from full right to full left.

The adaption of a ball steering knuckle tie-rod would go far toward improving the steering. The steering gear maker's contention that the alignment of the parts connected with the steering is not what it should be is to some extent correct.

G. E. FRANQUIST, Chief Engineer, James Cunningham Son & Co.

Editor, AUTOMOTIVE INDUSTRIES:

In the issue of AUTOMOTIVE INDUSTRIES of Sept. 14 I noticed an article relative to the front wheel "shimmy."

I have found that if the plugs that adjust the spring tension of the ball joints on the drag link are tightened it will in every case eliminate the "shimmy." At least I have never found a case that I could not cure by this method.

H. R. YOUNG,
Young & Patterson Co.

Editor, AUTOMOTIVE INDUSTRIES:

Referring to your article in the Sept. 14 issue, "What Makes 'Em Shimmy?" this has been somewhat of a puzzle to me during the past eight years. I have observed that cars equipped with rib tread cord tires are the worst offenders. The same car equipped with fabric tires driven at the same speed over the same pavement behaved very respectably. The remedy which I have applied is to set the knuckle pivots to an angle of 2 deg. 30 min., take up all play in the drag link, rebush the knuckles if they were worn and balance the wheels. I do not know whether this corrects the cause but it will correct the effect. Wobble occurs at speeds ranging from 8 to 15 m.p.h. Changing the course, increasing or decreasing the speed, will stop it. Cord tires are much more resilient than fabric. This fact, and the fact that wobble occurs at a certain speed, is a strong indication that vibration is the basic cause.

G. H. ALLYN.

Radiators and Cooling Problems

Engineers discuss many problems which arise in connection with this subject. Results of laboratory tests outlined.

Editor, AUTOMOTIVE INDUSTRIES:

With reference to the articles by A. L. Clayden which appeared recently in AUTOMOTIVE INDUSTRIES, on radiators and cooling systems, I would like to discuss a few points. I believe that such discussion and particularly a free and frank interchange of information is very desirable and must prove helpful to all concerned.

Mr. Clayden is to be congratulated for calling attention at the outset to the lack of quantitative data. It is to be regretted, however, that within a page after such a remark he gives an incomplete, qualitative curve bearing on the title of his whole article of Aug. 17, namely effect of water flow. The curve is incomplete and misleading

because it does not show that beyond a water flow of 2 to 3 gallons per minute per inch depth of core, 1 ft. wide there is nothing gained by increasing the water flow. This was clearly demonstrated as a result of the creditable work done in Washington on aircraft radiators. See *Tech. Paper Bureau of Standards*, No. 211, p. 312. Further the curve given by Clayden is qualitative and rather useless because he does not state the units of the ordinates.

Mr. Clayden favors forced or pump circulation system but I fear that he will not convince any one of the correctness of his views when he states that "it is a very hard thing to argue but the writer himself is convinced

that the cost of a reasonably satisfactory convection or thermo-siphon system is actually higher than that of a simple pump system” Personally I would have been very interested to see some comparative cost figures. It seems to me that the choice of a thermo-siphon system depends on the relative cost of the two systems and their relative advantages and disadvantages. As to the latter point I may call attention to the fact that the advantages of the thermo-siphon system are its simplicity—there is no pump, no pump bushing, no leaks, etc. Its disadvantages are that it is more sensitive than a pump system to low water level and it is more liable to freeze in winter.

Mr. Clayden seems to think that the so called critical velocity of water flow affects the rate of heat transfer and is responsible for the different water flow-heat transfer characteristics of different radiators. I am rather inclined to question the existence of a critical velocity—as the term is understood by hydraulic engineers. It seems to me that with pump circulation, at all ordinary ranges the water flow is turbulent; however, it has been found that heat transfer does vary with water velocity. See Bulletin 40, Engineering Exp. Station, University of Illinois.

Effect of Direct and Indirect Surface

In case of automobile radiators the effect of the relative amounts of direct and indirect surface has a great influence on the heat transfer; consider a flat plate radiator having 1 sq. ft. of radiating surface and 1 sq. ft. of copper, i.e. no indirect radiating surface. Suppose that the air is absorbing 100 heat units and that this is its capacity. Then if the water flow is increased, the heat dissipation will not increase because the air is working at capacity; if the water velocity is reduced the heat dissipation will be reduced, because the air can absorb 100 heat units but the water flow is not rapid enough to supply this amount, and tests show that the relation between water flow and heat transfer from water to metal is parabolic. Now, take the same amount of material but redesign the radiator so that its frontal area remains the same, and one-half of the material is used for direct radiating surface and the balance for indirect. Further assume that the efficiency of the indirect radiating surface is 70 per cent of that of the direct; the total effective radiating surface then is $(0.5 + 0.5 \times 0.70 \times 2) = 1.2$ sq. ft. Assuming that the heat transfer to the air per unit radiating surface remains the same, then the second radiator will reach its maximum heat dissipation at such a higher water velocity, at which the heat transfer from water to metal is 120 heat units. Beyond this point increase in water flow will not increase the heat dissipation, because the air at that particular velocity and mass flow cannot absorb any more heat; below this velocity the heat dissipation will drop because the water is not supplying the metal with sufficient heat units. If the design of the second radiator is such that the heat transfer per unit surface, which depends on the size of the cells, their shape and the general air flow changes, then the reader can easily work out for himself the result.

Air-Flow vs. Heat Transfer

Referring to the article of Sept. 7 I must correct the author for his statement that “there is no very direct relationship between air-flow velocity and heat transfer.” Heat transfer varies as the n th power of the air mass-flow. This was independently derived by the writer and also the Bureau of Standards. See above reference, p. 372, etc. The exponent n varies between 1 and 0.4 depending on the ratio of direct to indirect, etc. This law is not entirely new with either the Bureau of Standards or my-

self and its application to present day radiators and new designs is very useful. The French in the Eiffel Laboratory Tests adopted the relation: heat transfer $= (A + BV)$, where A and B are constants and V is the air velocity.

The curves given at top of page 464 are useless and misleading. They are useless because they do not give sufficient information in regard to the physical characteristics of the radiators and as before, the heat transfer is given in some mysterious unknown ratio. They are misleading because those who have not specialized and familiarized themselves with radiator characteristics, must conclude that an all direct radiator is superior, as far as cooling capacity is concerned, to a core having part indirect surface. This is not necessarily so; in general, an all direct radiator makes a better showing at high air velocities and a core having a large percentage of indirect, makes a better showing at low air velocities. At some intermediate air velocity the heat transfer curves cross each other and it all depends on the radiator core at what velocity they cross, or whether they cross each other or not.

There are a great many other points which I could discuss, but the above taken more or less at random must suffice. The average designer and engineer will do well to study the problem and get familiar with the fundamentals of the cooling system and the characteristics of the component parts, namely the radiator core, the fan, the pump and the effect of the piping. As to details these can be left to the ones who specialize in the manufacture of radiators, and who could supply the designing engineer with any detail information he may need.

N. S. DIAMANT.

Effects of Jacket Temperature on Economy

Editor, AUTOMOTIVE INDUSTRIES:

In your editorial “Cooling Ideals,” of Sept. 28, you say:

“A fairly long course of experiment with steam systems under pressure ought to give conclusive data as to the effect of definite degrees of heat above 212 deg. Fahr. Of course such data are not obtainable by simply adapting steam cooling to an engine designed for water cooling.”

I do not see just why you do not believe data upon the effect of higher temperatures with steam cooling may not be obtained with engines designed for water cooling. The only limitation will be the ability of the water jackets to withstand the pressures associated with the higher temperatures. Of course, some types of engines with flimsy sheet metal plates, held on with small screws, to close large foundry core openings will not stand any considerable pressure, but there are many engines now in use with but small areas of flat, unsupported jacket walls, that are entirely safe with water pressures up to, say, 30 lbs., corresponding to about 275 deg. Fahr., which should be high enough to draw definite conclusions as to the desirability of going to still higher temperatures.

It is an entirely mistaken idea that the engine design must be modified in some way to secure proper results with cooling by the boiling and condensing cycle. This is due, perhaps, to the belief that there must be a large jacket space provided for the accumulation of steam to avoid risk of overheating. It does not seem to be understood that where, as with the Rushmore system, the water is kept in circulation by a positive acting pump, there is no chance for the formation of large pockets of bubbles of dry steam. As a matter of observed fact, the higher the steam pressure the smaller are the bubbles of

contained steam and the more violent is the circulation; otherwise the modern high power locomotive would not be possible.

I have run a number of tests at my laboratory on a General Electric gasoline engine with four 7 x 9 in. cylinders, direct connected to a 25 kw. generator at 560 r.p.m. Under constant full load, on runs of two hours each, the fuel consumption per kilowatt hour was practically the same with the jacket water at 275 deg. as it was with the water at 160 deg. Fahr. From repeated tests, of two hours duration each, under half load, or 12½ kw., the fuel consumption per kw. hr. was about 10 per cent less with the jackets at 275 deg. than with the jackets at 140 deg. Fahr.

As the ratio of water cooled surface to cubic contents is very much less with the big 7 x 9 in. cylinder than it is with the much smaller automobile engine cylinders it would seem that the saving possible with the latter with the higher temperatures should be considerable.

Luther Ayer, factory manager of the International Motor Co., at Plainfield, who has driven his Studebaker car for more than a year with the Rushmore system, states that, under normal winter conditions, he obtains fully 20 per cent greater mileage per gallon of fuel than he could get with the same engine with the usual water cooling system.

Although there might be some further fuel economy from working the jackets at higher temperatures I do not believe it would warrant the added complication of the necessary pressure reducing valve between the en-

gine and the radiator nor the expenditure of power required to feed the water under pressure.

The Rushmore "up-flow" sysem, working at about atmospheric pressure, does not involve the least complication and permits the use of simple, inexpensive little gear pumps which may be of the very cheapest construction and which operate satisfactorily even with clearances so excessive as to make them unfit for any other class of service.

S. W. RUSHMORE.

Effect of Proper Cooling

Editor, AUTOMOTIVE INDUSTRIES:

We have read with interest the articles on cooling systems by A. Ludlow Clayden. We cannot supply any research data, as all these problems on the Rolls-Royce were worked out several years ago in our experimental department at Derby, England.

We can, however, confirm generally the statements of the four papers, especially with regard to the importance of a cylinder block design which discourages steam pockets and hot spots, a radiator of true honeycomb form which allows internal circulation of water, an adequate pump, and a free escape for the air passing through the radiator.

We can confirm also that when these items are attended to the brake horsepower and efficiency of the engine will be maximum with a water temperature of 180 deg. Fahr. to boiling.

M. OLLEY,

Engineer, Rolls-Royce of America, Inc.

Road vs. Laboratory Tests

Editor, AUTOMOTIVE INDUSTRIES:

There is probably no product of applied mechanics which, in practical usage, varies so widely from purely laboratory conditions as the automobile. While much good can come from laboratory experiments and tests, there are certain points which can only be discovered and corrected by intelligent work under the exact conditions governing the real use of the machine as a whole.

In the development of all forms of power, reliability has first been sought. When this was attained, economy was the desired goal. Reliability in the automobile has become pretty well established during the past dozen years and we have entered the era for economy.

Now in making experiments for power and economy in fuel, covering a number of years, all of which were made under true working conditions, I discovered some facts of seeming importance.

Troubles of Feed Systems

Even at this stage of progress, we have fallen heir to two legacies of earlier days which still are largely accepted.

One of these pertain to gravity fuel feed and the other to the offset float chamber. Anyone with a little knowledge of the laws governing the fall and lift of liquids can see that either gravity feed or an offset float may give trouble under certain conditions.

With a very economical carbureting system, I soon found the following difficulties:

With a low head of fuel, the float action became sluggish and a false level was maintained. The shut off was retarded and an excess of fuel admitted. Everyone has noted on opening the shut off valve with a full tank that the float chamber fills immediately while with a depleted

supply one must wait for the filling. This is not peculiar but absolutely according to natural law.

On completing a satisfactory vaporizing and metering device, I found one trouble. When racing up a hill, on reaching a steep incline the engine power fell off. This fault was remedied when I centered the float with the nozzle. I then recognized that the offset float has certain disadvantages, when the car is not operating in a horizontal position.

The point I wish to make is that these facts were learned entirely from road tests and they would never have been learned from any ordinary laboratory work. They were learned through the use of a carbureting system which showed nearly double the average mileage economy without being excessively lean, hence these faults were accentuated so they could not fail of ready recognition.

It is most unfortunate that, with the progress of the automobile, there has not been evolved a unit of power similar to the Watt in electric performance, which can be measured readily in actual service. Miles per gallon really mean nothing. Grades are not taken into account. There is no absolute indication of expended power.

Great benefit would be derived if the S.A.E. can discover a means for measuring the power developed under the conditions of actual usage.

The real test of the value of any device is its performance in practical service. A small circle digest the theoretical but the hard headed man looks only for results.

GEORGE M. BROWN.

THE Victorian Railway Department at Melbourne has adopted the rail motor-car to handle passenger traffic on short spur lines, and over other sections where it is uneconomical to provide a service of steam trains.

Automotive Industry Needs To Train More Skilled Mechanics

Accuracy in manufacture and care in inspection suffer greatly through lack of competent workers. Human element important in working to exact tolerances. There is a limit to what may be expected of machines. Bidding for operators is harmful.

By Harry Tipper

ACCURACY in production with our methods of machine operation is still a major production problem. Occasional tests on the outside indicate that the expected accuracy is not secured and that inspection is not as thorough as it should be. The latter really implies the former as well, inspection being necessary because of lack of accuracy. An engineer friend familiar with automotive practice, bought a new car of a good make not long ago and wrote the manufacturer for a tolerance sheet so that he could keep to the tolerances in any replacement or repairs.

Being of a curious turn of mind, he dismantled the car and checked up the dimensions of all the important elements by the sheet. When he got through he wrote the company a letter showing the variations and stating that his first job would be to bring the machine to the dimensions.

Limited errors from absolute accuracy were evidently expected. These were detailed in the sheet of permissible tolerances. But the actual shop operation evidently permitted errors of larger variation.

We have been depending almost entirely upon the machine for the accuracy desired in the product. A comparatively short training period suffices to make a mechanic and frequently the apprenticeship for an inspector is little more. Sensitive measuring instruments are used by these workers to check up their set-up and the result. These instruments themselves require careful handling to produce accurate results in measurement. It is difficult to operate some of them without a fair understanding of the principles upon which their operation is built. The fingers must be reasonably sensitive in operating and the influence of sudden changes in the handling must be understood. These things are not always known by the worker or the inspector, particularly where the plant employs large numbers of men and must take its operators from the average population.

Limit to Machine Accuracy

IN the small shop it is somewhat easier to select a better lot than the average and some of the smaller shops show the advantage of that in their work. The amount of spoiled work is quite considerable in some cases.

There is a strict limit to the accuracy secured in practice, regardless of the character of the mechanical equipment. The human element cannot be eliminated from the operation. It exercises its influence upon the result at all times. Foremen and superintendents are well ac-

quainted with the facts and they know that despite equipment, accuracy requires a definite skill and comes only with sound knowledge and experience.

It is still usual to find an engineer discussing production and particularly production accuracy, as though it were a matter of machinery and system. Data are frequently presented showing methods of inspection and examination, but not very much is said of the actual results secured in the shop or the cost of attaining these results due to the natural inaccuracy of the average skilled machinist in the automotive manufacturing establishment.

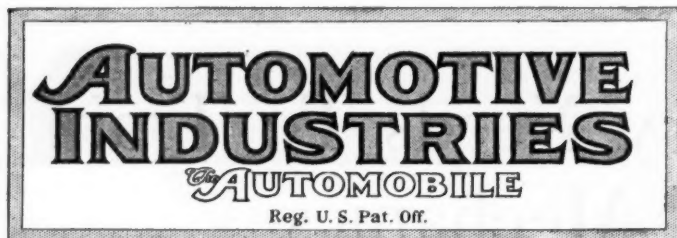
Industrial Training Necessary

MORE work must be done in the development of mechanics than we have done at any time up to the present. Mostly, whenever the industry is running at nearly full tilt and other industries in the metal trades are in fair shape, the automotive manufacturers bid against each other for the available labor, pay the price and get through with the work somehow. This, of course, does not make for increased accuracy in the work, nor does the large turnover help the situation any.

The automotive industry may not need to work to tolerances as close as some of those specified to-day. The point might be discussed effectively when due attention has been paid to the actual results secured in the car from time to time. Nevertheless, the industry does need to embark on a considerable program of developing skilled mechanics—men with a better background of understanding and experience than many of those at present on the job. No other branch of the metal trades industry has so many mechanical operations to go through in the building of its product and no other branch has a need for such numbers of skilled mechanics.

This is a problem for the manufacturer which he must answer in one way or another.

This year manufacturers have been bidding against one another in some of the automotive cities and the other metal trades lines have not been flourishing particularly. When they are all doing well from a production standpoint skilled mechanics will be scarcer than they have been this year. Young men should be brought into this field. They should be encouraged to do so. The best form of encouragement is a sound training in practice and elements of theory. Applied strictly to the work this is the training which makes for more understanding and more accuracy in operation.



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Red Tape and Overhead

LOWER production costs in the next few years will come through closer attention to overhead costs and small mechanical refinements. Time has ceased to be the chief consideration in production, although it is still important. Managers are realizing that saving in time of production can offset only a certain amount of increased overhead and subsidiary charges.

Comparatively little attention was given to mechanical production methods at the recent S. A. E. production meeting. The practical men gathered there were talking almost entirely in terms of cutting out red tape, reducing overhead, eliminating waste, and getting a better knowledge of the human element in production.

Quantity production has made possible low prices in the automotive field, but competition is making it necessary to reduce unit costs as well as to increase quantity. Mechanical production methods have already been studied so carefully and improved so greatly that major steps in advance can scarcely be

expected from now on. The various factors surrounding production, however, have not been subject to intensive study in the past. The possibility for extensive cost reduction lies in a better understanding of these related factors.

One automotive executive said recently, for instance, "I have learned more about unit production costs and overhead expense in the last twelve months than I had accumulated in the previous twenty years." His experience was not unique.

An Arrogant Automobile Club

WHILE more than 11,000,000 motor vehicles are in operation in the United States, the time has not yet arrived when motorists can safely take the position that they are entitled to a monopoly of city streets and public highways.

One of the most remarkable recent instances of selfish disregard of the public need by owners of automobiles is the stand taken by the Illinois Automobile Club in opposition to the application of John Hertz to the Illinois Commerce Commission for a franchise which would permit him to operate a modern bus system in Chicago.

The club does not want the buses "because they would further congest the boulevards." Discussing this phase of the opposition to Hertz's application, the *Chicago Daily Tribune* says:

"In other words, persons owning cars feel that they own the streets over which automobiles may run, and would, for their own selfish comfort and convenience bar anyone who does not own or have access to an automobile from use of the boulevards. The poor man, whose only opportunity to enjoy a ride on the city's most attractive streets might lie in the 10-cent bus line is nothing to them. Throw him out. The boulevards are too good for him, such is their attitude."

Is it any wonder, in the light of such cases as this, that state legislatures sometimes are tempted to "swat" the motorist with taxes which, fundamentally, are unfair, or impose onerous regulations to promote safety? The great majority of voters do not yet own motor cars.

It is this attitude of arrogance on the part of so many motorists which is responsible for much of the mania for regulation which is sweeping the country. The average motorist emits a loud wail when something is done to him which he does not consider fair, but it is more than possible that much of this attitude of antagonism would disappear if he would strive always to be courteous and fair to the other fellow.

As a matter of fact, the argument of the Illinois Automobile Club is illogical. Buses always tend to relieve rather than increase traffic congestion.

It should be gratifying to the industry to know that the *Tribune* is earnestly supporting the Hertz application. It says:

"There is only one condition of importance properly applicable to the granting of the franchises sought. That is the condition that the proposed bus lines should allow no standees in the busses. Every passenger should have a seat. Greater comfort, faster service, and a minimum of inconvenience would be the result. Those who pay would get what they pay for, and none would pay for what they could not get. With that single condition the franchises should be granted. The Chicago Motor Bus Co., with the experience, energy, ability and money of John Hertz and his associates behind it, will then do the rest. The great profit will be to Chicago and its residents."

Send Reckless Motorists to Jail!

By James Dalton

THE ghastly toll of deaths caused by motor vehicles in 1921 should jolt the industry into some concerted action which will help solve sanely its most menacing problem.

A report by the Census Bureau shows that 10,016 persons were killed in 34 States last year. This was an increase of 1065 over 1920.

It reads like the casualty list of a desperately fought battle in the World War rather than a record of the hazard attendant upon life in time of peace.

Nothing is to be gained by trying to place the burden of blame upon pedestrians, as one of the national organizations of motorists already has attempted to do. It may be true that carelessness was responsible for most of the deaths, but that does not relieve the motorist of responsibility.

If the casualty list of street and highway accidents is not reduced it will inevitably result in a labyrinth of regulations which will not only make driving a burden rather than a pleasure but will seriously curtail sales of motor vehicles.

For the automotive industry it is a practical as well as a humanitarian question. Glaring newspaper headlines, telling the story of people killed or maimed by cars or trucks, are kindling indignation every day the length and breadth of the country. This indignation cannot fail to be reflected in State legislatures.

Motorists know that burdensome licensing regulations will not cut down these accidents. The man who can pass the most rigid tests to which he might be subjected may be more of a menace at the wheel of a motor car than the merest novice at driving.

Two things are needed to cut down the toll of death. They are:

Sane and simple laws.

RIGID ENFORCEMENT OF THE LAWS.

If the laws which are enacted to make the streets and highways safe are just and sound they should have teeth in them. Fines are not enough. Violations should be felonies rather than misdemeanors.

Persons who violate such laws should be given just as fair a trial as those who are accused of any other crime, but if they are convicted after a fair trial THEY SHOULD BE SENT TO JAIL.

The careless, reckless driver, who is not will-

ing to concede that pedestrians have rights in the streets and who seems to regard public thoroughfares as his individual property, is a menace not only to the other motorists but to the entire automotive industry. He is building up sales resistance every day.

Careful analysis of the data in the possession of the Census Bureau might show that "jay-walking" was responsible for more deaths than anything else, but it wouldn't answer the question. The fact remains that animosity on the part of pedestrians toward motor vehicles is becoming stronger.

A majority of the people of the country are not motorists. Legislators usually are influenced by the majority unless right is undeniably on the side of the minority. It may be true, as one of the national associations of motorists says, that "the automobile always has been a subject of class legislation * * * and is subject to more regulations than any other means of conveyance," but the fault is largely that of the motorists themselves.

The average motorist seems to be governed by two kinds of psychology. There is the one which makes him curse the reckless or inconsiderate driver when he himself is a pedestrian, and the other in which he is engulfed when he himself is driving and which causes him to regard any pedestrian crossing a street or highway as a pest who is intruding where he has no right.

The average person who does not own or drive a car has only one psychology. Under the thrall of it he regards every motor vehicle as a juggernaut bent upon his destruction. In all too many cases he is entirely justified in this view.

Recriminations against unfair and burdensome regulations will not get the motorist anywhere. His attitude must be one of live and let live.

We repeat that if he is unwilling to submit to sound laws fairly framed to promote the safety of the public, he should be sent to jail. After a few days there he may still think the regulations unfair but he will obey them with scrupulous care.

The time has come for the automotive industry, as a matter of self preservation, if nothing else, to wake up and take the lead in accomplishing something tangible. Concerted action in this direction will not bring it into conflict with the Sherman law. It would not be a combination to restrain trade but to curb death.

Big Output Hinges on Body Supply

Closed Car Orders Exceed Production

Dealers Not Taking Open Models for Stocking Against Spring Demand

DETROIT, Nov. 4—Maintaining production marks at points approximating those of the earlier months of the year is largely a matter of material supply, closed bodies being the principal obstacle to continued heavy operations. Demand for open models is limited to special sections of the country and to export markets. Some factories report the demand for closed bodies now to be in excess of 75 per cent of output.

Several factories which have been among the leaders during the year are now operating on low schedules because of the failure of the closed body supply. Orders on many of their closed models are piled two months ahead, and the plants are operating at 30 to 50 per cent of former production figures. One of these factories with orders far ahead showed an operating deficit in the last two months.

For the most part dealers are declining to take open models for stocking against spring demand and are clamoring for all the closed models they can get. There is a general demand for closed cars from cities in every part of the country. Price uncertainty has caused dealers to fight shy against accepting any models except those for which they have a ready market. If there is to be any stocking, it will be light and will not take place in any volume until the spring season is at hand.

Business in Special Models

A large part of the present open body business is in special models with sport trimmings, the usual open types not making special appeal except in those cars which recently have been remodeled or repriced. New sport models will be brought out by a number of factories in the near future to meet the demand now existing for cars of this type.

Ford Motor Co. will build at the rate of more than 5000 cars daily. Sales are running in excess of production, and the company is extending its output as rapidly as it can. Chevrolet is now on a basis of about 1200 daily and will increase this to 2000 as rapidly as it can execute its new factory and production plans.

Buick is operating at close to 800 cars daily, this total including its Flint, Detroit and the McLaughlin Buick plant in Canada. Studebaker continues at its maximum of about 450 daily in all plants. Dodge Brothers is operating at about 600

Business in Brief

NEW YORK, Nov. 6—Activity is reported maintained in wholesale and jobbing lines. Recent price advances in some lines have stimulated buying, but ultimate action by the retail buyer is uncertain. Industry is running at a fast pace, with employment more widely diffused.

Car shortage is delaying marketing over the whole country. Farmers have been particularly hard hit and coal and lumber interests in the Northwest have been unable to supply orders on this account.

Car loadings for the week ending Oct. 21 were 1,003,759 or 20,289 greater than the previous week. The biggest increase was in loadings of merchandise and miscellaneous which was the largest ever recorded. Railroads report a demand for 166,349 freight cars over and above the available current supply.

Reports show that farmers' returns are irregular. Cattle, corn and cotton lead, with wheat fair, and oats, potatoes and fruit poor. Iron and steel have become quieter with lower coke prices, but buyers tend to await stabilization. Railroads are still bidding for new car purchases. Scrap and pig iron prices have eased. There is some talk of steel mills not being sold very far into the new year.

Better household buying has tended to steady coal prices. Soft coal output continues to gain. 10,400,000 tons were produced in the fourth week of October. 2,100,000 tons of anthracite were produced. Gain in output was chiefly in the latter and indicates a slight improvement in the transportation situation which remains the principal factor limiting production.

Industrial and railroad stocks rallied after a further sharp decline from selling pressure, mainly professional. Call money eased from the 6 per cent point to which it had been forced. Bonds were stronger, Liberty bonds and the new 4½'s making substantial advances reflecting a revival of investment demand.

daily, its normal capacity, Hudson-Essex at about 250 daily, Hupp at about 125 daily, and Paige-Jewett at 125.

(Continued on page 953)

1922 Total So Far Placed at 2,119,227

Almost Equals Production of Cars and Trucks for All of Best Previous Year

NEW YORK, Nov. 6—Not only has October, with its estimated output of 244,000 cars and trucks, been the seventh consecutive month of the year to show production in excess of 200,000, but it has brought the figure for the ten-month period to within a few thousand of the total output for the best previous year in the production history of the industry. Thus far the aggregate for 1922 is 2,119,227, as compared with 2,205,197 in 1920.

Factories are still behind in filling orders for closed cars and are hampered in making deliveries by the unsatisfactory rail situation. It is probable that there will be a tapering off in production in November, although there is no evidence now that the demand for cars is showing any notable signs of weakening. This is the season when in other years the slowing up in sales has been pronounced. Manufacturing efforts are centering chiefly on closed models, for which there has been an exceptionally brisk demand.

No Stocking of Open Cars

Taken in conjunction with the remarkable record for the month, reports from all parts of the country show that there is only a negligible stocking of open cars. At present, it is not likely that there is more than one month's supply of this type in dealers' hands or on the road to dealers. This fact indicates that the entire production is being sold and that manufacturers are not producing in excess of actual demand.

Practically the only section of the country where there has been any accumulation, and that in very small numbers, is the Northwest. In that section, however, there is a pronounced feeling that such reserve is necessary to take care of the farmer demand which is expected to appear as soon as the returns from this year's crops are received.

Factories are making greater use of driveways to surmount difficulties

(Continued on page 953)

Seek Easier Method in Drawback Claims

**Bauer of N. A. C. A. and Treasury
Representative Will Work
on Problem**

NEW YORK, Nov. 6—G. F. Bauer, foreign trade manager of the National Automobile Chamber of Commerce, and a customs expert from the Department of the Treasury are planning a trip to Detroit to study the drawback law and devise a method for putting in drawback claims without the necessity of keeping cumbersome books. This co-operation between the treasury department and the N. A. C. C. is expected to save the automobile industry something like \$20,000 a year in drawback allowances which are not collected now.

Under the tariff law automobile manufacturers can collect drawbacks on imported material which has gone into finished cars. For instance, sheet aluminum used in car bodies carries a duty of 11c a pound. When this sheet aluminum is worked into a car body and that car body is exported, the car manufacturer can file a claim and secure the return of the duty that was paid on the crude material.

This same thing applies to crude aluminum used in crankcases, housings, running boards, etc., imported bearings and the like. Heretofore the red tape necessary to secure the return of this duty has caused automobile manufacturers to overlook an item which runs into considerable money in the course of the year.

This trip to Detroit will be made about Nov. 24, at which time there will be a meeting of the foreign trade committee, of which J. Walter Drake is chairman. The program of the foreign trade convention, to be held during the New York show, will be arranged at that time.

Half Million in Profits Peerless Mark in October

CLEVELAND, Nov. 17—All production and sales records and earnings for the past twenty-one years were shattered by the Peerless Motor Car Co. in October this year, President R. H. Collins states.

Profits for the month were at the annual rate of \$28 a share for the stock, and the month was closed without a stock of unsold finished cars.

Shipments for the month of October totaled 1009. This is more than five times the number shipped in October, 1921, and more than 35 per cent greater than last May, when the present management established a new record for production and shipping figures.

The largest annual output of the old management was 5100 cars. A total of 10,000 is expected to be reached in the year ending August, 1923.

Profits in October available for dividends and surplus are reported in ex-

Lower Manufacturing Costs Have Reduced Closed Car Prices and This Has Increased Its Popularity

By J. DALLAS DORT,
President, Dort Motor Car Company

Detroit, Nov. 7.

NEVER before in the history of the automobile industry has there been such a volume of buying sustained so late into the fall and winter seasons as is being experienced this year. Public interest in automobiles was never more pronounced and sales have never approached the marks that are now being made week after week.

There can be but little question but that this volume of business is due in a large sense to the progress the industry has made in reducing the cost of manufacture and, as a result, the market price of closed cars. High prices kept the closed cars from a position which they might normally have occupied earlier and now that these prices are lower, we find them gaining in favor steadily in every part of the country.

Even in southern California we find closed cars in the ascendancy in a large part of our business, running from 50 to 60 per cent. Where less mild or even climates are found our demand is now averaging about a similar figure.

The progress of the closed car indicates the progress of the industry as a whole. Closed car prices are lower because manufacturers have discovered ways of lowering manufacturing costs, of eliminating weight and unnecessary material, both in bodies and chassis. Business is becoming more and more confined to the large manufacturers because they have been most successful in reducing costs of producing cars. Reducing the weight of cars is important both from a manufacturing and an owner operating standpoint.

To me the outlook for business in 1923 is exceptionally good. Conditions in Europe, bad as they are, are improving. France, Germany and Russia should make definite progress toward reparation. Even in the Far East the worst seems to be over. Australia is already taking a large number of American cars as are South America, South Africa and many other parts of the world.

In the United States the year should be one of great national prosperity. There will be bad spots due to industrial conditions from time to time but we have learned pretty well to discount strikes and their effects. It seems as though there are always enough good spots to make it look like one vast field of green. Last year it had a very yellow look. Throughout the South from the Atlantic to the Pacific coast there is a very healthy tone due to good crop conditions and fair prices. Thousands of automobiles are being purchased and many more thousands will be sold as rapidly as the farmer makes his successful turnover.

I have talked with many distributors and dealers in the past few weeks and there is a healthy tone in the reports they gave me. There is a strong general demand and a pronounced demand in sections such as the coal districts where there has been pent-up business due to industrial conditions or other causes.

cess of \$500,000. Annual dividend requirements are \$600,000.

Olds Breaks Records

LANSING, Nov. 7—As the result of a price reduction late in September, all post-war production records of the Olds Motor Works were broken during October, according to Guy Peasley, general sales manager.

CHEVROLET BUILDS IN OAKLAND

OAKLAND, CAL., Nov. 7—Construction of a large addition to the East Oakland plant of the Chevrolet Motor Co. is under way. The new unit will double the capacity of the plant, and will be a two-story building of brick and concrete, to cost \$280,000. It will cover an entire block and will be completed and occupied early next year. The new unit will be devoted largely to building of bodies for closed Chevrolet cars, according to announcement by officials of the company.

\$1,751,905 Earned by Nash in Quarter

KENOSHA, WIS., Nov. 6—Nash Motors Co. for the three months ended Aug. 31, 1922, reports net earnings of \$1,751,905. Net earnings for the nine months of the fiscal year total \$5,023,441. C. W. Nash, president of the company, commenting on the above showing, said:

All this year we have been in a practically oversold condition despite plant additions and increased production. Sales figures of the first 10 months of 1922 show that 95 per cent more Nash cars have been marketed this year than during the first 10 months of 1921. The advent of better business conditions generally and the noticeable improvement among agricultural districts of both the Middle West and Southwest, together with a better outlook in tobacco and cotton territories of the country, point to a considerably greater demand for Nash cars this coming year than we have ever witnessed.

Ford's Boston Visit Rouses Speculation

May Be Interested in Securing
Squantum Plant Site for
Export Station

BOSTON, Nov. 6—Henry Ford has been spending several days in Boston and has been keeping to himself all plans pertaining to his visit. It is reported, however, that he appeared to be much interested in the Squantum plant, where the Government built submarine destroyers during the war.

For more than a year Mayor Bradford of Quincy has been in touch with Ford regarding a site in that city fronting on Massachusetts Bay near the big Fore River Shipbuilding Co. The Squantum site would be admirable for an export station, and that is what Ford is looking for, presumably.

Visited Barge Canal

Not long ago Edsel Ford made a trip through the New York State Barge Canal and obtained all the data needed to give him some idea of utilizing the canal for freighting motor vehicles eastward. It is stated that bids have been asked from shipbuilding companies on barges of a special type for this work.

As the cars could come across from Detroit, Cleveland and Toledo on boats and be dumped off at Buffalo, it would be easy to transship them and drop them off along the route easterly. Toledo has just discovered it has some land and dock available, and this is to be used for a tie-up with the New York Canal.

Goods from Buffalo, Toronto and other places could be taken along also, and other cars in addition to the Fords and Lincolns could be shipped, while cargoes westward would be easy to handle. With a regular schedule and a few good towboats, deliveries might be made in a couple of days between Buffalo and New York.

No Extensions on Pacific Coast

SAN FRANCISCO, Nov. 6—There will be no additions to the Ford plants on the Pacific, with the exception of a small increase in the size of the assembling plant at Los Angeles, according to Edsel Ford, who passed through the San Francisco Bay district on an inspection tour of Ford plants and dealers. He said:

Our business does not warrant extensions or expansions of the Pacific coast plants at the present time. Existing facilities are sufficient to take care of the present normal increase in business, and there will be no additions to the plants on this edge of the continent except a small one to the assembly plant at Los Angeles. In fact, it probably will be some time before any automobile manufacturing, as distinguished from assembling, is done away from the main plant at Highland Park, near Detroit. That plant is in closest and most convenient proximity to sources of supply, and it is there that the manufacturing of cars will be done for some time to come.

FATALITIES INCREASED 28 PER CENT IN 1921

WASHINGTON, Nov. 7—Statistics compiled by the Bureau of the Census show that during 1921 automobile fatalities increased 28 per cent. The record shows that 10,168 deaths resulted from accidents caused by automobiles and other motor vehicles, excluding motorcycles. This number represents a death rate of 11.5 per 100,000 population as against 10.4 in 1920 and 9.4 in 1919 and 9.3 in 1918.

The State of New York had 1633 casualties or 15.4 per cent per 100,000 population in 1921, as against 13.5 per cent in 1920. Pennsylvania was next with 1086 casualties or 12.2 per cent for each 100,000 population, as compared with 11.9 per cent in 1920. According to the Bureau of Census there were 886 deaths resulting from automobile accidents in Illinois; 865 in California; 737 in Ohio; 519 in Massachusetts; and 443 in Michigan. The other states had fewer casualties. In Detroit there were 133 deaths from automobile accidents.

This puts at rest reports which had been prevalent among Ford dealers and had even been printed in the newspapers up and down the coast that Edsel Ford had come here looking for a site for a large western manufacturing plant.

Besides Mr. and Mrs. Ford, the visiting party included E. C. Kanzler, production manager for Henry Ford, and Mrs. Kanzler, who is a sister of Edsel Ford; W. A. Ryan, sales manager; B. L. Graves, western district supervisor, and R. H. Tannahill. They came in the Ford special car, "Fair Lane," from southern California, and left on the evening of the 31st for Portland, Ore.

KNOX TIRE REORGANIZED

MOUNT VERNON, OHIO, Nov. 6—There has been a reorganization of the Knox Tire & Rubber Co., whose plant here was purchased recently by the reorganization committee for \$175,000. F. O. Levering will continue as president, while George Jones succeeds F. D. Spencer as secretary-treasurer. As soon as the necessary machinery can be installed, the reorganized company will start producing tires.

MIDWEST RUBBER MEETING

CHICAGO, Nov. 4—Official notice that the November meeting of the Midwest Rubber Manufacturers' Association will be held in St. Louis Nov. 14 has been sent out by the secretary. The meeting place will be the Missouri Athletic Association, and arrangements are in charge of a committee, of which the chairman is F. W. Knoke of the American Zinc & Lead Smelting Co.

52 Companies Added as M.A.M.A. Members

General Manager Heminway Announces New Names in Membership of Association

NEW YORK, Nov. 6—Fifty-two new members have been admitted to the Motor and Accessory Manufacturers' Association, General Manager M. L. Heminway announces. The new members are:

Akron-Selle Co., Akron; Aluminum Co. of America, Pittsburgh; Aluminum Die Casting Corp., Garwood, N. J.; American Chemical Paint Co., Philadelphia; American Taximeter Co., 16 West 61st Street, New York City; Arrow Grip Manufacturing Co., Inc., Glens Falls, N. Y.; Automotive Products Corp., Hazleton, Pa.; Auto Specialties Manufacturing Co., St. Joseph, Mich.

R. & L. Baker Co., Cleveland; Baush Machine Tool Co., Springfield, Mass.; Bijur Motor Appliance Co., Hoboken, N. J.; Britton Auto Products Co., Inc., New York; Broad Brook Co., New York; Buckeye Forging Co., Cleveland; Bullard Machine Tool Co., Bridgeport, Conn.

Canton Drop Forging Manufacturing Co., Canton, Ohio; Columbus Bolt Works Co., Columbus; Cuno Engineering Corp., Meriden, Conn.

Dalton & Balch, Inc., Chicago; Delphos Bending Co., Delphos, Ohio.

Empire Tire & Rubber Co., Trenton, N. J., Everyday Piston Ring Co., E. Rochester, N. Y.

Franklin Die Casting Co., Syracuse, N. Y. Glidden Co., Cleveland.

Harvey Spring & Forging Co., Racine, Wis.; Holley Carburetor Co., Detroit; Hoover Steel Ball Co., Ann Arbor, Mich.; Houdaille Co., Buffalo, N. Y.

Indiana Steel Products Co., Chicago. Morand Cushion Wheel Co., Chicago; Metropolis Bending Co., Metropolis, Ill.; Morgan Manufacturing Co., Keene, N. H.; Muzzy-Lyon Co., Detroit.

Nairn Linoleum Co., New York. Packard Electric Co., Warren, Ohio; Pharo Manufacturing Co., Bethlehem, Pa.; Pines Manufacturing Co., Chicago.

Recording Devices Co., Dayton, Ohio. Scintilla Magneto Co., Inc., New York City; Spencer-Smith Machine Co., Howell, Mich.; Standard Parts Co., New York City; Spiro Manufacturing Co., New York City; Stemco Engineering Co., Dayton, Ohio.

C. A. Taylor Trunk Works, Chicago; Ternstedt Manufacturing Co., Detroit; Trumbull Steel Co., Warren, Ohio.

Universal Products Co., Detroit. Westinghouse Lamp Co., New York City; Whyte-Duffield Manufacturing Co., Chicago; Wickey Battery Co., East Chicago, Ind.; Wood Hydraulic Hoist & Body Co., Detroit; Wyman-Gordon Co., Worcester, Mass.

U. S. TRACTOR PROGRESSES

MENASHA, WIS., Oct. 30—Rapid progress has been made in the last six months by the U. S. Tractor & Machinery Co. in liquidating its indebtedness, and adequate capital has been provided to enable the concern to resume quantity production of tractors and farm operating equipment in a larger scale. Manufacturing schedules will be increased Nov. 1.

South Hails Cotton Rise and Ford Cut

Alabama Newspaper Points Out Two Outstanding Features of Price Situation

BIRMINGHAM, ALA., Nov. 7—Under the date line of "Greenville, Ala.," the Montgomery (Ala.) *Advertiser* prints an item reading: "The farmers of Butler county are rejoicing no little bit to-day (Oct. 18), for they received notice that cotton had increased \$3 per bale in price and that Fords had declined \$50.

"The farmers of this county are big buyers of automobiles, due to the excellent roads over which they can drive them, and Butler county is one of the state's biggest cotton-producing counties. The increase in price of cotton and the reduction in Fords will put much extra money into circulation and everybody in the county will profit thereby."

What is true of Butler county is also true of practically all cotton producing counties of South Alabama. With the cotton crop of Alabama worth approximately twice what it was worth last year, and on the present market a little more than twice as much, the farmers of Alabama are in a good position to buy automobiles, and while a great many of them are purchasing Fords, others want larger cars, and prefer to spend the extra amount on the automobile.

Alabama's other crops are also increasing in value. This is particularly true of the corn crop, which will be almost equal in value to that of last year, although 20,000,000 bushels short in quantity.

The cotton producing counties of South Alabama are a good bet for sales of medium priced cars this fall and winter, and they never have a closed season on account of cold weather.

Motor Truck Industries Outlines Year's Program

DETROIT, Nov. 7—A vigorous constructive program for 1922-23 was outlined at a meeting of the National Association of Motor Truck Industries held at the Detroit Athletic Club. The speakers were M. L. Pulcher, president of the association; Don Whittaker, general manager; C. A. Musselman; C. A. Vane, general manager of the National Automobile Dealers' Association; Tom Snyder, secretary of the National Association of Commercial Haulers and also secretary of the Indiana Transfer & Warehousemen's Association, and S. B. Hadden of the Allied Motor Commerce.

The program of the association calls for constructive education of the motor truck dealer. The keynote of the meeting was that the future of the industry will be based entirely upon the soundness of the manufacturing and merchandising policies of the companies in this business. This soundness can be reached, it is pointed out, only by proper co-

DEALERS NOT WAITING FOR PAINTING OF CARS

DECATUR, ILL., Nov. 7—Decatur automobile dealers have devised one scheme to speed-up deliveries of closed cars, so greatly in demand as fall and winter season purchasers appear.

"We're taking cars from the factory before they are painted," explained one dealer, "and finish them in our own shops. It costs us more but we save time and meet the consumers' demands for immediate delivery. Our shop is kept busy, too."

operation between the manufacturers and parts makers.

According to the program which the association has set for itself, the manufacturer and dealer who is operating his business with a spirit of permanency and sound values will receive the support of the organization which is composed of assemblers, parts manufacturers and dealers, each of which group is represented on the controlling board.

Mexico City Places Order in England for 50 Buses

MEXICO CITY, MEXICO, Nov. 4—An order has been placed in England for fifty double-deck motor buses by the Mexico City Traction Co., Ltd., which operates the electric street railway system here. It is stated that these buses will be equipped with both electric and gasoline power, one to be held in reserve for emergency use. The vehicles will each accommodate about fifty passengers. They will be made to serve populous quarters of the city which are now without transportation facilities. It is stated that if the buses prove the success that is now expected, many others will be brought here and placed in service to suburban towns.

Plans are also on foot for the establishment of motor truck freight lines between the capital and various cities of this part of Mexico. Some hauling of this character is now being done, but when the proposed lines are put into effect, which will be about the first of the coming year, motor trucks will handle shipments between Mexico City and Toluca, Puebla, Pachuca, Cuernavaca and even more remote points, it is asserted.

CORRECTION

Henry J. Eberhardt of the Newark Gear Cutting Machine Co., who is chairman of the Tooth Form Committee of the American Gear Manufacturers Association, presented the report of that committee at the recent Chicago convention, and not F. L. Eberhardt, as erroneously stated in the report of the convention contained in AUTOMOTIVE INDUSTRIES of Oct. 19.

Gasoline Drops Cent in Producing State

No Reason Assigned for First Price Cut Made in California in Year

LOS ANGELES, Nov. 5—Without assigning any reason, the retail price of gasoline has been reduced one cent a gallon. This is the first change in price for approximately one year. Despite the enormous quantities produced in this State, California motorists have been paying more for fuel than those in some other parts of the country. By some it is claimed the price reduction is a move on the part of the biggest producers to keep new competition out of this field.

The Shell Oil Co. recently bought out a number of so-called independent concerns and has entered upon a program of expansion. The Associated Oil has gradually advanced its service stations from Northern California to within forty miles of Los Angeles and is known to intend to operate here eventually. At present the Union and Standard companies are the largest operators. The General Petroleum is a big producer, but does not market its product to the retail trade.

Record Consumption in State

Gasoline is now enjoying its record consumption in California. The market is at its best and gasoline is the only oil product of the industry which does not have a surplus stock at this time. Under date of Sept. 1 a report was issued stating that gasoline stocks were 19,000,000 gallons less than on the same date a year ago. This amount is said to be barely a sufficient cushion to protect adequately the industry from a temporary gasoline shortage.

The production of oil is gaining daily, and it is said refineries are reluctant to increase the manufacture of gasoline at this time because of the necessity for accumulating other residue stocks.

With enormous quantities of crude oil going into storage and new wells being brought in daily, also the demand for gasoline increasing constantly, refineries are at a loss for a market for fuel oil and are hoping to develop a foreign export business sufficient to relieve the situation.

LINCOLN AGREEMENT ENDS

DETROIT, Nov. 6—Lincoln Motor Co. has given notice that the stockholders' protective agreement, dated Nov. 20, 1921, has been terminated. Depositors have been notified that upon surrender of their certificates of deposit, properly endorsed in blank to the respective depositaries, they will be entitled to delivery of shares represented thereby. The depositaries are: the Central Union Trust Co., New York; Union Trust Co., Detroit, and Commercial Trust Co., Philadelphia.

Service Heads Make Ready for Meeting

Choose Subjects That Will Come
Up for Discussion in Chi-
cago Next Week

NEW YORK, Nov. 6—H. R. Cobleigh, secretary of service of the National Automobile Chamber of Commerce, has completed the program for the meeting of factory service managers, which will be held at the Hotel LaSalle, Chicago, on Nov. 14 and 15.

The first day will be devoted to factory problems and the second day given over to selling service associations to the dealer associations. The meeting will be opened with an address of welcome by Thomas J. Hay, president of the Chicago Automobile Trade Association. H. J. Leonard, vice-president and general manager of the Stephens Motor Car Co., also will talk.

There also will be reports from the service and the pirate parts committees, after which the following topics will be discussed:

How to save transportation costs by shipping parts in carload lots of cars.

How are the taxable and the non-taxable parts distinguished?

Parts discounts to independents.

Boxing parts for shipment.

Flat rate systems in practice.

Lubrication and inspection policies.

Overcoming misrepresentation of service by over-zealous salesmen.

The feature of the second day, which will be the service association conference, will be a three-cornered discussion of the importance of better service and service associations as a means to improve it. The owner's point of view will be handled by Alexander Johnston, editor of Motor; the car seller's point of view by Gene Silver, Cole distributor in Chicago; and the maker's point of view by B. B. Bachman, president of the Society of Automotive Engineers and engineer of the Autocar Co.

The afternoon of the second day will be given over to a discussion on how to make service associations most effective. There will be an experience meeting of service association and service division delegates. The N. A. C. C.'s service division's speaker's bureau also will take a hand and will tell how it functions for the service associations and divisions, helping them get topics, speakers and films to make their meetings of greatest interest and benefit. One of the speakers will be C. J. Buckwalter, president of the Ambu Engineering Institute.

ASKS TO SELL PARKER TIRE

INDIANAPOLIS, Nov. 8—Permission to sell the assets of the Parker Tire & Rubber Co. has been asked by the receiver, the Bankers Trust Co. of this city. It is said that recapitulation of

CAB FIRM IN PARIS HAS YELLOW AS COLOR

PARIS, Oct. 26 (by mail)—The Yellow Taxicab Co., having nothing in common with the Chicago concern except the name, began operations in Paris this week. The French concern has adopted yellow as the color for its cabs with the idea of attracting American clientele.

All the drivers, in addition to their native tongue, are capable of speaking English. The cabs are 12 hp. Renaults with high-class landaulet bodies, and carry a selection of American and French daily newspapers for the convenience of passengers.

the assets of the company made by a former office manager of the firm and a representative of the receiver has reduced the ledger value of the concern from \$550,147 to \$65,415.

Liabilities are said to consist of a bonded indebtedness of \$150,000 secured by a mortgage held by the Security Trust Co. of Indianapolis. It is stated that all but a small part of these bonds were deposited with creditors. No action has yet been taken on the application.

Fleet Owners Returning to Market, Day States

DETROIT, Nov. 6—Vance Day, general sales manager of the General Motors Truck Co., asserts that for the first time in two years large fleet owners are again buying trucks on a large scale.

It is his contention that instead of receiving small orders for one or two trucks, as they have been doing, the five big packers, owners of some of the largest truck fleets in the world, are again in the market with the Standard Oil Co. and other large fleet owners. The truck company, Day says, has been filling single orders for 20 and 25 trucks at a time and salesmen report that still larger orders will be forthcoming soon.

Would Shift Tax Burden from Farmers to Trucks

TOLEDO, Nov. 7—The Commonwealth Highway Association has been formed here with the expressed purpose of launching a campaign to lighten the road-tax burden on farmers and place more of it on the owners and operators of motor trucks.

Maintenance of roads which will bear up under heavy loads is also urged by the association.

Several truck owners here are in favor of the plan, as it will permit them to do greater business on the roads as well as stand part of the cost.

The heavy burdens placed upon farmers, it is believed, is holding up considerable road improvement which would benefit the truck operators.

New Buses Planned for Chicago System

Ritchie States They Will Be Better
Than Those of London
or New York

CHICAGO, Nov. 6—Changing the name from the Chicago Motorbus Co. to Chicago Motor Coach Co. and deciding to call the manufacturing corporation the Yellow Coach Manufacturing Co., John A. Ritchie and George A. Green, former executives of the Fifth Avenue Coach Co. of New York and now with the Hertz interests here, have decided to make some aggressive moves toward giving Chicago a bus system of which it can be proud.

All but three or four of the present heavy lumbering buses will be junked, and their places taken by 300 modern coaches of a design originated by Green. It is expected that soon after the inauguration of this new service, it will be necessary to increase the fleet to 500.

Production to Start in 1923

Production of the new vehicles is to start early next year, and in preparation for this an addition will be built to the present Yellow Cab factory. It is expected that by April the Yellow Coach Manufacturing Co. will be producing two coaches a day. The capacity of the plant will be four daily and this, it is thought, will be reached before the end of 1923. Although a considerable proportion of the first production is expected to go for use in Chicago, President Ritchie declares he will start building up a sales organization for the merchandising of the coaches and the method of operation throughout the country.

There will be two types of coaches, both of which will be powered with specially designed Moline-Knight engines. A double-deck low level coach, with a crew of two men and with a seating capacity of 68, will be operated over the trunk lines leading from the residence sections to downtown. On outlying boulevards which serve as feeders to the main line a large limousine type will be operated. This also is designed for interurban use. Completely enclosed and seating 25 passengers, the limousine coach will be operated by one man and passengers will pay as they enter. The double-deck will weigh about 11,000 lb. and the limousine coach about 6300 lb.

Similar to New York Bus

The double-decker is to be similar in design to that used by the Fifth Avenue Coach Co. in New York. It will not be an exact duplicate, however. Ritchie says that in designing this new vehicle the best buses and motor coaches in the world, including those of the General Omnibus Co. of London and the Fifth Avenue Coach Co. of New York, have been studied critically and the best points of all have been embodied in the new design.

Massachusetts Has Light Regulations

N. A. C. C. Asks That Time Be Allowed Makers of Tail Lamps to Meet Demands

NEW YORK, Nov. 6—Massachusetts threatens to set a new style in tail-lights which is expected to spread throughout the country. In brief, it has ordered that after Jan. 1 all rear signals used in the Bay State must really illuminate all the numbers of the license tag. In order to do this the new regulation specifies that the lamp and bracket to which the number plate is affixed shall be integral; that the numbers be legible at a distance of 60 ft. and that the slot through which the rays of light shine on the numbers be made of glass.

Inasmuch as this radical order will affect the car manufacturers and cause them to change their lighting system to a certain extent, so far as Massachusetts is concerned, the matter has come to the attention of the National Automobile Chamber of Commerce, which has investigated the new law.

N. A. C. C. Not Greatly Opposed

"We are not violently opposed to it," said Alfred Reeves, general manager of the N. A. C. C., to-day. "We have asked that we be given time to so arrange manufacturing plans that we can meet Massachusetts demands. Also we want the assurance that none of our manufacturers will be prevented from manufacturing the kind of a bracket demanded and not run foul of a patented article."

Motor Vehicle Registrar Frank A. Goodwin, of Massachusetts, has set Monday, Nov. 13, as the date upon which he will test out the rear lamps submitted to him by motor vehicle and lamp manufacturers to see if they comply with the new regulations. Each maker must deposit \$50 with the registrar, and on Nov. 15 Goodwin will announce the list of those lamps which have passed the test.

Advices from Boston state that Studebaker, Packard, Buick, Ford, Dodge Brothers and Overland have sent in lamps for approval.

Big Cost to Motorists

This new law will cost Massachusetts motorists at least \$500,000, it is figured, because few if any comply with the regulations. There will be no evasion tolerated, and Goodwin declares that after Jan. 1 any motorist caught not using a lamp stamped as approved may be taken into court or Goodwin will revoke his license.

Before adopting the new regulations, which are shown elsewhere on this page, Goodwin sent inspectors out to make an investigation. They found that out of the first 182 electrically equipped cars there only was one whose rear numbers were visible 60 ft. away. In other words, 99 per cent of the vehicles were not obeying the law. On 97 of this number

Table Showing What Massachusetts New Rear Light Regulations Effective January 1 Require

1st—It shall be so constructed that the lamp and bracket to which the number plate is affixed shall be one device.

2d—The lamp shall be so constructed with reference to the bracket that it shall be above the center of said number plate when said plate is affixed.

3d—It shall be so constructed that the slot through which the beam of light shines shall be a sufficient distance above, and beyond the plane of, the number plate so that there will be an even distribution of light over the entire face of said plate. The largest plate used in Massachusetts is 14½ inches by 6½ inches.

4th—There shall be used in said lamp a bulb of not less than 2 candlepower.

5th—On every lamp and bracket approved there must be stamped some distinctive mark or name so placed that it may be seen readily.

6th—The slot through which the beam of light shines shall be covered with glass, and no other substance, such as celluloid or mica, will be permitted.

Note—An oil lamp or an acetylene lamp must be so constructed as to comply with the 1st, 3d, 5th and 6th requirements. While it will be necessary for the lamp to be located with reference to the bracket holding the number plate so that there will be an even distribution of light over the entire face of said plate, it need not necessarily be so constructed that it will be above the center of the plate, but may be located at the left end of it. The light from an oil lamp must develop 4 candlepower, and a ¼-foot burner shall be required in connection with an acetylene lamp.

For commercial vehicles only the lamp will be permitted at the left end of the plate, on condition that a 4 candlepower bulb is used. All other requirements of the specifications are adhered to.

the slot through which the light plays was too small to give enough visibility; on 112 the celluloid over the opening was defective and 12 had no celluloid. There were 176 with the light not located properly. Briefly, 97 per cent were not located properly, 68 per cent had defective celluloid and 53 per cent had too small openings.

Present Year Will Prove Biggest in Remy History

ANDERSON, IND., Nov. 6—I. J. Reuter, general manager of the Remy Electric Co., states that the company by the end of this year will have broken all its previous production records, with an output of nearly half a million sets.

A schedule of 1500 generators and 1500 starting motors a day has been set for November and December with corresponding increases in other departments.

August has been set down as the biggest month in the present year and the biggest month in the history of the company.

DAIMLER INCREASES CAPITAL

NEW YORK, Nov. 6—A radio to the *Journal of Commerce* from Frankfurt, Germany, says: "The Daimler Motoren-fabrik, producer of the Mercedes is doubling its capital by an issue of 204,000,000 marks common and 12,000,000 marks preferred. A broad scheme of development of the company's home and foreign selling organizations is contemplated."

Complete Compiling Manual on Used Cars

NEW YORK, Nov. 5—A Manual of Used Car Co-operation, intended to assist dealer associations or groups of dealers desiring to work together for the profitable handling of used cars, will soon be ready for distribution to the trade.

The manual has been compiled under the auspices of the National Association of Automobile Show and Association Managers, 239 West 39th Street, New York. It will be made available for dealer association secretaries and others desiring it at a nominal price covering the cost of compilation and publication.

The manual does not make any claim to furnish a panacea for the used car situation. It sets forth the steps that can be taken by a group or association of dealers in any community to co-operate in establishing definite used car values in that community. In the book will be the forms necessary to set up and operate the machinery of co-operation with full explanations of how the forms are used.

Compilation of the manual was completed this week at a conference of the compilation committee, including Herbert Buckman, manager of the Cleveland Automobile Manufacturers and Dealers' Association, L. B. Sanders, secretary of the Boston Used Car Statistical Bureau and Neal G. Adair, editor of *Motor World* and executive secretary of the National Association of Automobile Show and Association Managers.

Tire Output Shows Gain Over Year Ago

Production in September Drops,
However, from Mark Made
in August, 1922

NEW YORK, Nov. 6—An increase in tire production for September over the same month a year ago is noted in the figures compiled by the Rubber Association of America, Inc., for the Department of Commerce.

The output, however, declined from the total for the previous month of this year.

A comparative table of inventory, production and shipments of casings, tubes and solid tires is as follows:

PNEUMATIC CASINGS				
	No. Mfrs.	Inven-	Produc-	Ship-
1921—	Reporting	tory	tion	ments
Jan. ...	45	5,319,605	703,430	965,417
Feb. ...	45	5,193,018	819,892	1,073,756
Mar. ...	46	4,597,103	1,163,314	1,614,651
April ...	49	4,527,445	1,651,418	1,785,951
May ...	59	4,451,668	2,100,917	2,085,882
June ...	63	4,154,456	2,313,365	2,643,850
July ...	63	3,892,037	2,570,524	2,757,581
Aug. ...	66	3,934,853	3,043,187	2,894,442
Sept. ...	63	3,340,798	1,929,268	2,047,929
1922—				
Jan. ...	66	4,174,216	2,055,134	1,596,806
Feb. ...	66	4,691,329	2,084,308	1,562,365
Mar. ...	63	5,183,286	2,645,790	2,073,963
April ...	65	5,464,336	2,401,187	2,086,651
May ...	65	5,523,095	2,721,503	2,639,273
June ...	64	5,042,147	2,838,890	3,133,260
July ...	63	4,834,106	2,476,636	2,695,095
Aug. ...	63	4,629,392	2,905,209	3,029,823
Sept. ...	64	4,612,037	2,504,744	2,502,106

INNER TUBES				
	No. Mfrs.	Inven-	Produc-	Ship-
1921—	Reporting	tory	tion	ments
Jan. ...	47	5,586,163	740,824	1,042,617
Feb. ...	46	5,415,464	916,627	1,123,881
Mar. ...	48	5,044,861	1,346,483	1,643,690
April ...	51	4,916,772	1,762,122	1,983,571
May ...	57	4,751,880	2,210,040	2,342,567
June ...	60	3,835,098	2,359,928	3,232,673
July ...	61	3,122,815	3,020,981	3,603,248
Aug. ...	64	3,649,319	4,430,152	3,804,060
Sept. ...	62	3,827,830	3,274,822	2,645,758
1922—				
Jan. ...	66	5,246,647	2,343,393	1,889,724
Feb. ...	65	6,141,956	2,596,774	1,702,583
Mar. ...	63	6,991,118	3,017,511	2,090,737
April ...	65	7,230,096	2,650,573	2,329,343
May ...	65	7,189,552	2,970,696	2,938,947
June ...	64	6,186,534	3,130,629	3,973,679
July ...	63	5,675,829	3,068,199	3,630,744
Aug. ...	63	5,207,228	3,808,224	4,220,055
Sept. ...	64	5,164,757	3,501,442	3,558,971

SOLID TIRES				
	No. Mfrs.	Inven-	Produc-	Ship-
1921—	Reporting	tory	tion	ments
Jan. ...	12	303,753	21,220	29,116
Feb. ...	12	304,374	23,365	29,599
Mar. ...	12	283,800	28,710	43,926
April ...	12	269,985	28,859	42,080
May ...	12	264,663	35,156	40,122
June ...	11	240,336	28,395	49,867
July ...	11	220,003	35,123	55,678
Aug. ...	11	216,367	55,694	66,866
Sept. ...	11	161,832	37,441	50,276
1922—				
Jan. ...	11	181,769	40,224	33,294
Feb. ...	11	183,448	39,492	36,805
Mar. ...	11	182,197	49,433	48,350
April ...	11	173,748	46,664	52,309
May ...	11	170,904	57,640	60,711
June ...	11	169,808	66,089	63,408
July ...	11	176,375	71,505	60,425
Aug. ...	11	189,698	84,313	69,435
Sept. ...	11	200,016	82,767	66,797

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

JAPAN IS GIVING UP USE OF JINRIKISHA

LOS ANGELES, Nov. 5—So sudden and pronounced has been the decrease in the use of jinrikishas in Japan that Daisuke Akiha, head of the oldest and leading jinrikisha manufacturing plant there has announced that the major portion of his large establishment will shortly be diverted to other lines of activity.

Akiha declares that the prejudice that so long existed against the use of motor vehicles is fast disappearing and, as he believes the days of the rikisha are rapidly drawing to an end, he has determined to anticipate the impending situation and proceed accordingly.

Whereas, ten years ago more than 300,000 jinrikishas were in use in Japan, the total now barely reaches 70,000.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

New Chalmers Six Coach Has Unusually Wide Body

DETROIT, Nov. 6—The Chalmers six coach, just put on the market, is a five-passenger inclosed car of the composite type, built on the standard Chalmers chassis and listing at \$1,585.

Distinctive features in design are found in the unusual width of the body, the broad doors, the front seats, which fold and then tip forward—the driver's chair completely clearing the steering wheel and wide windows all around, offering a clear view for all passengers.

The body is maroon with black superstructure. A carmine stripe on maroon runs around the body several inches below the belt. Black disk wheels, with maroon trimming, add to the striking appearance. The substantial fabric covering of the rear and rear side panels is cut in one piece running from one side-window to the opposite side-window. The roof is also fabric covered.

Interior trim is in broadcloth with hardware of satin finish. The door-window lifters are of the lever type. Rear quarter windows are operated by a strap.

A large trunk is mounted on a nicked trunk rack at the rear. For this a dust cover is also supplied. Wood trunk bars of natural finish protect the body. Additional equipment includes parking lights, windshield visor, rear view mirror, windshield cleaner, dome light, non-skid cord tires, five disk wheels, heater and windshield of double ventilating type with the upper glass hinged from the top and the lower from the bottom.

Proposing Flat Cars to Hurry Deliveries

Manufacturer Advises California
Dealer—Damage Is Feared
from Tramps

LOS ANGELES, Nov. 6—The freight situation has become acute with automobile distributors in Southern California. Representatives of some of the most popular makes of cars are thirty days behind in deliveries of open models and sixty days behind in closed cars. One company has twenty-two carloads en route from the factory and trace of them has been lost.

Dealers who are in position to make immediate deliveries are enjoying the business they would not have otherwise. This is because of the large number of cancellations and the customer's determination to buy a car that he can get without delay. One distributor has been notified by his factory that the only way shipments can be made to him will be by using flat cars.

This puts him in a quandary because cars shipped at this time of the year with only a canvas covering to protect them from the weather usually are damaged in transit. Not only do they suffer from exposure to the weather, but there always is an especially large number of tramps headed for Southern California in the winter, and when they steal a rail ride, they like nothing better than to occupy the soft upholstery of an automobile.

Usually they are very careless in their habits and enjoy such pastime as cutting holes in the leather, carving their initials on the instrument board, or scratching them in the finish. This makes the dealers hesitate before ordering shipments by flat cars.

Railroads acknowledge their inability to meet the situation. It is reported that at one point in Nevada there are approximately one hundred carloads of automobiles in the freight yards waiting for motive power to bring them to this city.

International Harvester Introduces Speed Sedan

CHICAGO, Nov. 8—The International Harvester Co. has introduced a de luxe bus for hotel, club and resort use. It is known as the International Model S speed sedan. The top is art-craft construction. The seats are wide and deep cushioned. Fourteen to fifteen passengers may be comfortably seated.

Entrance is obtained through three side doors, while a passage at the end of the third seat gives easy access to the rear without disturbing other passengers. Speeds of 25 to 30 m.p.h. can be obtained. The length of the chassis overall is 185% in. Heavy pneumatic truck cord tires are a part of the regular equipment.

Men of the Industry and What They Are Doing

McMullen Is Apperson Treasurer

In the refinancing of the Apperson Bros. Automobile Co. of Kokomo, Ind., Roger B. McMullen of Chicago, a pioneer in the automotive industry, has been made treasurer, and A. S. Terrill of A. S. Terrill & Co., investment securities, has been added to the directorate. McMullen was in the bicycle and supply business before the days of the automobile as the Roger B. McMullen Co. of Chicago. In 1902 he was one of the organizers in Chicago of the American Motor Car Manufacturers Association, which was an association of those automobile manufacturers who did not recognize the Selden patent. He acted as its secretary and manager for one year. He has since been connected with the A. L. Smith Co., Hydraulic Pressed Steel Co. and Hale & Kilbourne Co., Philadelphia, all connected with the automotive industry.

Westcott Appoints Schreiber

Karl O. Schreiber, who has been assistant superintendent of the Springfield works of the International Harvester Co. for the last two years and prior to that served as general foreman at the Akron plant, has resigned to become assistant to the president and director of factory operations at the plant of The Westcott Motor Car Co. President B. J. Westcott has been in active charge of the plant since the first of the year. Schreiber has been identified with the engineering, manufacturing and inspection departments of the Continental, Chalmers, Hupmobile, Oldsmobile, Packard and Reo companies during the last twelve years. He went to the Harvester company from Lansing. Supt. C. H. Smart of the Springfield works of The International Harvester Co., states that Schreiber's successor has not yet been selected.

Changes with International

H. F. Perkins, vice-president of the International Harvester Co., has been assigned as assistant to the president in the general administration of the company's affairs, and G. A. Ranney, secretary, has been elected vice-president and treasurer. Cyrus B. McCormick, Jr., has been placed in charge of the manufacturing plants of the company throughout the world. A new office of director of engineering has been created with E. A. Johnson, who has been manager of the experimental department up until this time, appointed to the position.

Fox Announces Personnel

President Ansley H. Fox of the Fox Motor Car Co., Philadelphia, announces the personnel of his organization as follows: General superintendent and factory manager, William K. Swigert, formerly of Marmon, and for seven years

Chalmers superintendent; chief engineer, Paul F. Hackethal, formerly with Mercer, Templar and Buick; purchasing agent, C. H. Landsittel, formerly with Haynes, Templar, Garford and Duesenberg; assistant superintendent, J. H. Kreidler, formerly with Hudson, Northway Motors, Steering Gear & Parts Co., and the Gear Grinding Machine Co.; general sales manager, Fred C. Vanderhoof, formerly with the Standard Steel Car Co. and before that general manager of the Philadelphia Ford plant.

Bitting's Duties Enlarged

George L. Bitting, sales manager of the Eaton Axle Co. since its organization, has taken over the sales management of the Standard Welding Co. of Cleveland. Both companies are divisions of the Standard Parts Co. of that city. P. T. Hill succeeds his former chief as sales manager of the Eaton Axle Co. Hill also has been with the axle company since its organization and previous to that was connected with the Torbensen Axle Co.

Woodworth Returns to Fuller

Frank Woodworth, several years ago identified with Fuller & Sons Manufacturing Co., Kalamazoo, has returned to that concern as production manager, succeeding William T. Clarke. In the interim Woodworth has been with the Remy Electric Co.

Inches Buys for Hercules

Charles W. Inches has been appointed purchasing agent of the Hercules Motor Manufacturing Co. of Canton, Ohio.

Carmody with Chain Company

John D. Carmody, formerly a territory manager for the Champion Spark Plug Co. and more recently a district manager of the Wainwright Engineering Co., has been appointed middle western manager for the Columbus McKinnon Chain Co. of Columbus, manufacturer of Dreadnaught tire chains. He will have his headquarters in Chicago and will cover Illinois, Iowa, Missouri, Minnesota, Wisconsin, Kansas, Nebraska, North and South Dakota.

Star Rubber Names Hilbish

G. H. Hilbish has been appointed special factory representative out of Akron by the Star Rubber Co., Inc., of that city. He served with the B. F. Goodrich organization in various capacities for nine years, and later with Goodyear for approximately eight. With the latter company Hilbish had charge of the Akron branch, was afterward connected with its Cleveland and Grand Rapids branches and more recently was manager of the branch in Toledo.

Reeves on Washington Committee

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has been appointed by Secretary Hoover of the Department of Commerce as a member of the General Committee Co-operating on Trade Association Activities. The purpose of the committee is the compilation of a book on trade association activities, embracing more than 4500 trade associations, of which the automotive industry is one of the major associations. The work of the industry, as embodied in the activities of the N. A. C. C., will be shown by Reeves, under whose supervision the chapter on the automobile industry is being written. The book will be printed about Jan. 1 and will carry a complete list of trade associations in America, with an explanation as to their scope.

Sheldon Changes Agencies

George H. Sheldon, for a number of years closely identified with the automobile and tire industries in an advertising capacity, has resigned from Snodgrass & Gayness, Inc., New York, after being associated for the past three years, and has become general manager of Thresher Service, advertising, with offices at 136 Liberty Street, New York. Prior to his association with Snodgrass & Gayness, Inc., Sheldon was general manager of the New York offices of the McJunkin Advertising Co., Chicago.

Campbell-Ewald Toronto Head

Milton D. Bergey has been placed in charge of the Canadian office of the Campbell-Ewald Co., which has been opened in Toronto. Bergey was formerly advertising manager of General Motors of Canada, Ltd., and later associated with a Canadian agency. He has a wide acquaintance in Canadian advertising and selling circles.

Muir Joins Hall Lamp

James A. Muir has severed his connection with the Corcoran-Victor Co. of Cincinnati and associated himself with the C. M. Hall Lamp Co. of Kenosha, Wis., caring for the jobbing trade.

Prof. Wilson with Standard Oil

Prof. Robert E. Wilson, director of research of the Research Laboratory of Applied Chemistry of the Massachusetts Institute of Technology, has resigned and become identified with the Standard Oil Co. of Indiana.

Howe Advances Brown

Thomas R. Brown, Jr., formerly office manager of the Howe Rubber Corp., New York, has been appointed New York district manager with headquarters at 232 West 58th Street, New York City.

Chalmers Property Will Be Sold Dec. 7

**Maxwell Likely to Purchase It
—Receiver Is Now in Charge
of Affairs**

DETROIT, Nov. 8—The plant and properties of the Chalmers Motor Corp. will be sold at receiver's sale on Dec. 7 under the terms of a final decree entered in Federal court on the petition filed by the Fisk Rubber Co. and the Metropolitan Trust Co. of New York for the appointment of a receiver. William S. Sayres has been named special master to conduct the sale, the upset price on the entire property being fixed at \$1,987,500.

Bids will be accepted on three parcels, the first comprising the land and buildings, the second the inventory of material and goods in process of manufacture and the third the claims, accounts, patents, good will, trade names, stocks, bonds, etc., and particularly the special claim filed by the Chalmers company against Maxwell Motor Co., Inc., in the suit of Jenks & Muir Manufacturing Co. versus Maxwell.

Parcel Protected by Lien

The sale will be made without valuation, appraisal, redemption or extension. All of the property in the first parcel is covered by the lien of the first mortgage made by Chalmers to the Metropolitan Trust Co. as trustee Sept. 1, 1917. Pledges must be deposited 24 hours in advance of the sale to indicate the intention to complete the purchase. Should the bid be accepted the upset prices on the three parcels, respectively, are \$1,350,000, \$225,000 and \$412,500.

Deposits required in each case are \$135,000, \$22,500 and \$41,250 or the collective sum where a bid on the entire property is anticipated. Pledges on each of the three lots may also be made in notes or claims on the first \$405,000 of the first mortgage, six per cent five-year gold notes, the second claims of \$65,500 and the third claims of \$123,750. Deposits may also be made partly in cash and notes or claims.

Maxwell Holds Notes

Most of the notes and claims outstanding of the Chalmers company are held by Maxwell, \$2,500,000 of the \$3,150,000 mortgage issue and about \$4,000,000 in other claims. Though technically the sale is open to the highest bidder, the conditions are such that it is practically limited to the Maxwell interests and the property will be bought in by this company at a reasonable market figure as part of its plan to merge the two companies and rejuvenate the Chalmers line.

Pending the sale, the affairs of the Chalmers company are being directed by B. E. Hutchinson, treasurer of Maxwell, as receiver. Limited production is being carried on until full control is vested in Maxwell, when it will undertake an ex-

tensive expansion. The Chalmers plant will be continued as the six cylinder car plant and will be further used to extend the manufacturing requirements of the two cars.

PERSONAL NOTES

Watson Stabilator Names Stephens

Earle Stephens, who has been president of the Earle Stephens Co. of Pittsburgh, distributor of Moon cars for the past three years, and formerly general manager of the Auburn company there, is now in charge of sales for the Watson Stabilator Co. of Pittsburgh, at 324 South Highland Avenue, which handles nothing but stabilators. This is in accordance with the uniform policy of the John Warren Watson Co. who are building a distributing system of their own in the principal cities of the country. The company in New York is headed by B. C. Helm, formerly sales manager for Packard Motor Car Co. of New York, in Detroit, E. V. Ripplingille, formerly national service manager of Hudson and Essex cars is in charge. In Troy, N. Y., Julian Williams, who has distributed Kelly-Springfield tires, is handling the Stabilator.

Champion Appoints MacManus

Robert A. Stranahan, president of the Champion Spark Plug Co., Toledo, announces the appointment of MacManus, Inc., of Detroit, as advertising counsel.

Miller in Promotion Work

Franklin A. Miller, formerly advertising manager of Stromberg Motor Devices Co., has joined the staff of the Dunlap-Ward Advertising Co., Cleveland, and will have charge of promotion work. For the past three years Miller headed his own company, merchandising automotive parts and accessories.

Duffus Represents N. A. D. A.

R. O. Duffus has been appointed an assistant general manager of the National Automobile Dealers Association, further augmenting the association's field staff. He formerly was manager of the Packard branch at Kalamazoo, Mich., and later of the Lincoln sales department of R. E. Fair, Ford dealer in the same city.

Indictment Charges False Label Used on Spark Plug

CLEVELAND, Nov. 8—The Federal Grand Jury here has indicted David Goldston, alias David Goldstein, alias D. Charles, alias Charles David and Tom O'Leary on charges of using the mails to defraud by placing Champion X labels on alleged spurious spark plugs. The genuine spark plug is made by the Champion Spark Plug Co. of Toledo.

Franklin Postpones Building New "Four"

**Cost of Materials Said to Make
Production Impossible at
Price Intended**

SYRACUSE, Nov. 8—Production of the new Franklin four, which was to sell for about \$1,000 and be on the market next April, has been indefinitely postponed by action of the board of directors of the Franklin Automobile Co.

The rising cost of materials, which, it is said, made it impossible to produce the car at the price intended, is the reason for the change in the plans of the company. The sale of additional stock has been discontinued.

The company also announced that it has discharged the force of 300 men which has been working at the experimental plant, and only a few engineers will be retained.

The indications are that the new Franklin four will not appear on the market at any time next year. Work on the proposed plant for the new car has not been started, though the company has already purchased a large factory site east of the city.

Officials of the company refused to discuss in any way the decision to postpone production, which came as a great surprise in automotive circles here.

The plant for the six cylinder car will continue to operate at present capacity.

British Send Assurance on Rubber Restriction

NEW YORK, Nov. 9—Assuring the members of the Rubber Association of America that they need have no fear that the new British law restricting crude rubber production will work adversely to their interests, the Rubber Growers Association of London has cabled a reply to the American invitation to send over a committee for a conference, suggesting waiting to see how the restriction will work out.

The cablegram says:

Council of Association thanks you for friendly message and cordial invitation to New York, but considers that as the scheme has only just been started it will be best to wait and see what effect it has on all branches of the rubber industry. Meantime we shall welcome your association considering advices in regard to U. S. A. needs of crude rubber during 1923 as we are all opposed to any idea of creating actual shortage of supplies. We therefore feel that American manufacturers need have no fear that the scheme will work adversely to their interests.

Chairman Hotchkiss called a meeting of the American committee for this week.

LEWIS-HALL RECEIVER

DETROIT, Nov. 9—The Federal Court has named the Union Trust Co. of Detroit receiver for the Lewis-Hall Motors Corp., manufacturer of trucks.

Banker Antagonism Nil, Haynes States

Dodge Brothers President Completes Tour of Cities in Northwest Section

DETROIT, Nov. 7—Following a six weeks trip through the Northwest territory and Pacific Coast, President F. J. Haynes of Dodge Brothers declares the general business condition to be "healthy from the feet up." With John A. Nichols, Jr., general sales manager of the company, he visited Dodge Brothers dealers, bankers and other merchants in all important cities, getting first-hand impressions.

Haynes said that a new cycle of prosperity has started which is sound and healthy and has none of the aspects of boom times. Bankers and merchants everywhere regard it as a substantial and permanent improvement. They are content to witness a gradual improvement because they have just seen a tragic example of the other kind of development—the kind that accumulates so much momentum that the brakes of good business judgment are useless in an emergency.

Haynes states that the improved conditions were most noticeable in the cities and larger towns, but that the purchasing power and inclination to buy in the rural sections are improving appreciably. Both Haynes and Nichols were impressed with the absence of antagonism which has been attributed to bankers by automobile men in some parts of the country. "The average banker to-day views certain makes of cars as standard merchandise," Haynes said.

In almost every State there was declared to be less evidence than ever before of the usual winter slow-down in business. This condition was declared to be reflected at the factory, which is maintaining production at a point approximating the high-pressure mark of earlier in the year.

Big Production Hinges on Body Supply for Cars

(Continued from page 944)

Maxwell has run into a shortage of closed bodies, and production has been reduced considerably below earlier season figures, but will rebound as rapidly as the body plant can be brought up to high output. Chalmers operations continue at the former rate, pending the completion of negotiations for the taking over of the company by Maxwell.

Cadillac continues to lead in the better priced car field, holding its schedule close to 100 cars daily. Packard production is continuing steadily at about 2000 monthly. Lincoln is at capacity, but the production facilities are low and will continue so until the completion of plant extensions now under way. Wills Sainte

Claire is operating at approximately 20 cars daily.

Oakland and Oldsmobile sales are high, production at the factory showing increases in October with a probable further increase in November. Both are operating in excess of 100 cars daily. Reo is building in excess of 100 a day, this total including cars and trucks. Columbia is building about 50 daily.

Dort is building about 100 cars daily. Durant is building 100 Durant fours a day at the Lansing plant, and is starting in on a production of more than 100 daily on the Star car. Gray is now building about 100 cars daily and is making additions to its dealer organization steadily. Earl Motors is building about 1000 a month.

Nash Output

CHICAGO, Nov. 6—Nash Motors at Kenosha is producing about 192 sixes and fours daily at its Kenosha and Milwaukee plants.

Total for 1922 So Far Is Placed at 2,119,227

(Continued from page 944)

in delivery. Last month these increased from 30,055 in September to 33,320. Instead of a falling off in carload shipments there was an increase from 25,950 in September to 26,980 in October. Boat shipments declined from 8002 to 7404 last month.

Most encouraging are the reports from truck manufacturing centers. Business shows an improvement of 75 per cent over a year ago, with production for September 35 per cent greater than in the same month last year. Some plants are operating at capacity to meet the growing demand for rail cars and motor buses. Better industrial conditions are enhancing sales of motor trucks in those sections, and interest is showing a greater awakening among farmers.

NEW GILL PISTON RINGS

CHICAGO, Nov. 7—Two new piston rings, known as the Special Oil Wiper and the Servus Step-Cut, are announced by the Gill Manufacturing Co. The former has a square oil-return space around the bottom, while the latter is a step-cut ring. Like the Gill Interlocking Joint ring, these rings are individually cast, out of round, of a gray iron composition. They are lathe-turned for quick-seating and are claimed to lap themselves in against the cylinder walls in a short time.

Dort to Solve Sales Problems in Branch

"Experimental Studio" in Detroit to Be Used for Introducing New Methods

DETROIT, Nov. 8—Dort Motor Car Co. has opened a factory branch in Detroit under the management of E. J. Poxson, assistant general sales manager at the factory, who at the same time will retain his factory connection, so that there will be a distinct factory tie-up in the conduct of the branch.

It is the plan of the company to use the branch as an experimental studio in which will be worked out methods for improving retail merchandising and servicing of cars. As methods are tested out and found productive, they will be recommended for adoption by all Dort retail establishments.

With the exception of New York, Detroit will be the only city in which a factory branch will be maintained, and this because of the proximity to the factory and the generally close competitive condition of the market. Very careful investigations and analysis of the market will be made and its particular requirements from both sales and service angles studied.

In its selling plan, the company will operate to a large extent on a specialized salesman plan rather than the districting plan. Salesmen equipped to handle certain types of trade will specialize upon them with the fundamental thought of easy servicing as a common working ground. They will be free to extend their activities to any part of the city where their class of trade may be found. As a dealer organization is built up in the city the same open privileges will be extended. Only distributor territory will be restricted. Two years' experience has shown the open plan most successful.

On business involving trade-ins the company will make it a policy to accept cars only at a price permitting of ready re-sale.

CORRECTION

The export shipments of motor parts, not including engines and tires, for the first nine months of this year, was given in the previous issue of AUTOMOTIVE INDUSTRIES as having had a total value of \$128,410,260. This statement, as the accompanying detailed table showed, was a typographical error, the correct total being \$28,410,260.

Table of Imports and Reimports of the Automotive Industry for September, 1922, and Nine Preceding Months

	Month of September—				Nine Months Ending September—			
	1921	1922	1921	1922	1921	1922	1921	1922
IMPORTS								
Automobiles	No. 69	Value \$97,365	No. 26	Value \$27,443	No. 399	Value \$698,771	No. 269	Value \$497,599
Parts, except tires	..	29,254	..	34,214	...	768,995	...	470,034
All other	..	1,251	..	2,061	...	113,096	...	65,199
REIMPORTS								
Automobiles (free of duty)	443	695,586	85	114,581	3,182	5,021,757	1,117	1,871,272

Railroads Ordering More Freight Cars

Present Number Available Now
for Automobile Shipments to
Be Augmented by 3900

NEW YORK, Nov. 8—James S. Marvin, head of the traffic department of the National Automobile Chamber of Commerce, sees relief ahead for the industry in the report he has received that six railroads have ordered 3900 new automobile cars, which will bring the total in service up to 110,000. The new cars have been ordered by the Northern Pacific, Norfolk & Western, A. T. & Santa Fe, 1000 each; C. M. & St. P., 500; C. R. I. & P., 300, and Western Pacific, 100. In addition, the Grand Trunk is figuring on ordering 2000, the C. R. I. & P. and C. M. & St. P. an additional 500 each.

Marvin also calls attention to the fact that the Car Service Division at Washington has sent out another order to all railroads to relieve grain shipping. Box cars are ordered sent West empty from territory west of Pittsburgh, Cleveland and Detroit. Automobile cars are specified as exempt from this, and instructions to send these cars into manufacturing territory are re-stated.

Co-operating with the N. A. C. C., General Manager C. A. Vane, of the National Automobile Dealers' Association, has asked the dealers to watch for the improper use of automobile equipment and get it back immediately to the manufacturing area.

"If you will report to this office any such misuse in your territory, we will take it up immediately with the American Railway Association, so that proper steps can be taken to put these carriers back into automobile service," writes Vane.

Receiver for Syra-Cord Works on Reorganization

SYRACUSE, Nov. 8—Reorganization of the Syracuse Rubber Co., maker of the Syra-Cord, is under way following the appointment by Federal Judge Cooper of William Rafferty of this city as receiver for the company. Rafferty posted a bond of \$50,000 to continue operations.

Even though the assets of the company exceed its liabilities by \$360,000, the company in its petition stated that it is unable to borrow sufficient funds necessary to work its way to reorganization. The action is one in equity brought by Albert J. Richards of Mountainview West, N. J., a creditor for \$3,100. The company consented to the appointment of a receiver.

The company has been in business since 1920. Within a short time it was in financial difficulties, but was able to pull through by loans from President E. R. Caldwell, who died July 6. Caldwell's death was a severe blow to the company.

The inventory shows \$784,003 assets, compared with current liabilities of \$228,779, first mortgage bonds of \$123,800, leaving a capital balance and reserve for unpaid dividends amounting to \$360,300.

Studebaker Big Six Line Is Increased \$50 to \$135

SOUTH BEND, IND., Nov. 6—Studebaker Corp. has increased the list on its Big Six, the increases ranging from \$50 to \$135, according to body style. The list is as follows:

	Old Price	New Price
7-pass. phaeton.....	\$1,650	\$1,785
4-pass. sport phaeton....	1,785	1,835
4-pass. coupe.....	2,275	2,400
Sedan (regular).....	2,475	2,475
Sedan (special).....	2,650	2,750

The increase was made in order to place the Big Six line on an earning basis justified by the actual value built into the car and the somewhat limited production possibilities in this particular model, it was stated at the factory.

In connection with the change in price, the company has adopted a strict policy on used car valuations and is urging its dealers to accept cars only at a price well within the resale price established by current sales, so that quick turnovers may be made.

Autocar Increases Lists Effective in December

ARDMORE, PA., Nov. 6—The Autocar Co. has announced a price increase on all truck models to take effect Dec. 11. The new prices will be as follows:

SHORT WHEELBASE MODELS

	Old Price	New Price
4 to 6 ton.....	\$3,950	\$4,200
2 to 3 ton.....	2,950	3,100
1½ to 2 ton.....	1,950	2,200

LONG WHEELBASE MODELS

	Old Price	New Price
4 to 6 ton.....	\$4,100	\$4,350
2 to 3 ton.....	3,075	3,200
1½ to 2 ton.....	2,050	2,300

ROLLS-ROYCE OUTPUT GROWS

SPRINGFIELD, MASS., Nov. 8—Production is on the increase at the Rolls-Royce plant here. Better than eight chassis a day are now being turned out, and the coach department is very close to the same rate of output. It is expected the goal of ten chassis a day will be reached by the beginning of 1923.

Sales of the phaeton were much stimulated by the price reduction.

ELECTRICAL ENGINEERS MEET

WASHINGTON, Nov. 7—The Washington Society of Engineers of the American Institute of Electrical Engineers, held their fall meeting here with an attendance of more than 100 members. E. R. Whitney, president of the Commercial Truck Co., the principal speaker, delivered an illustrated lecture on the development of the electric truck.

Mason Tire Prices Increased 5 Per Cent

Does Not Put Lists Materially
Higher Than Those of Other
Manufacturers

AKRON, Nov. 7—Mason Tire & Rubber Co. of Kent, near Akron, has announced a blanket increase of five per cent in prices of all tires, effective Nov. 15.

Just what effect the Mason move will have upon Akron tire manufacturers is problematical. Tire men here refuse to commit themselves as to whether or not their companies definitely are planning price boosts this month, although many admit that such upward revisions are logical in view of the steady increase in cost of cotton and crude rubber.

When tire companies, a few weeks ago, engaged in their last price-cutting scrimmage with each other, Mason undercut practically all competitors so that the 5 per cent increase does not put Mason tires at a mark materially higher than the standard list prices on the same size tires of other manufacturers.

It is admitted that tire men want to increase prices but on the other hand they express the fear that increases may serve as a damper upon spring orders from dealers, and as they want to keep their factories running up to standard as much as possible through the winter months by working on spring orders already received and upon those anticipated, they do not want to do anything to jeopardize the spring spurt.

Tire production, which reached a low mark in the Akron district during October, has been increased slightly and further increases are contemplated. Factories not only will build back above normal their finished goods inventories but will work on spring commitments so as to be amply prepared for heavy spring tire buying.

Jackson Motors Prepares to Turn Out New Models

DETROIT, Nov. 8—Jackson Motors Corp., a division of Associated Motor Industries, is employing about 60 men in the development of tools, jigs, etc., for new models which are expected to be introduced some time around the first of the year, according to C. L. Halliday, vice-president and general manager.

Definite production plans have not been formed, but the plant at Jackson will be used principally for the manufacture of Jackson cars and will also be used in part for body building for Jackson and other cars in the Associated Motors line.

No fundamental changes from the former Jackson models are expected, according to Halliday, except that the cars will be refined both as to chassis and bodies to bring them up to latest developments in the industry.

Business on Sound Basis in Uruguay

More Firmly Established Than
Ever Before—Conditions Re-
turning to Normalcy

MONTEVIDEO, URUGUAY, Oct. 5—*(by mail)*—The automobile business in Uruguay is gradually returning to normalcy, and although it will be some time before the movement of the years 1919 and 1920 is reached, it can be safely said that the business is more firmly established and on a sounder basis than ever before.

The boom of 1919 and 1920 undoubtedly did more harm than good to the trade, because, in the excitement of the time, firms and individuals who had no experience rushed into the automobile business. When the reaction of 1921 came along, a large percentage failed or otherwise dropped out. Many automobiles of various makes were brought out from the States on the strength of bank credits, which could not be met when the crash came and eventually were sold at auction, in many cases at ridiculous prices.

Fittest Survive

But all those who were not fitted to survive the depression have gone, and, therefore, it can be truthfully said that the automobile trade in Uruguay is now on a sound basis.

If the import figures for the first half of 1922 are taken, it would seem that the car trade is in worse shape than ever, because a total of only 190 cars were imported into the country from Jan. 1 to June 30, 1922, as against a total of 833 in the same period of 1921. Such a conclusion would, however, be erroneous, because a large proportion of the cars imported during the first half of 1921 were still in stock unsold on Jan. 1, 1922. In fact, a careful estimate shows that around 800 new cars were in Montevideo dealers' hands at the beginning of this year. While only 190 cars were imported during the first half of the year, actual sales of all makes approximated 1000 cars during the same period, divided about equally between Montevideo and the country.

European Popularity Gone

Practically all the cars that are being imported now are of American manufacture, the one time popularity of European makes having disappeared, and while the Citroen, Renault, Wolseley, Austin, Fiat, Lancia and others are still on the market, their sales are few and far between. The American car is now firmly entrenched in Uruguay.

It is interesting to know that Uruguay ranks among the countries having the highest per capita proportion of cars. On June 30, 1922, it had a total of about 12,500 cars and trucks in service, of which 5200 are in the city of Monte-

Contest Committee Announces Official Air Records Made at Meet Which Was Held in Detroit

NEW YORK, Nov. 4—The following official records of the events at the Detroit air races have been announced by Russell B. Shaw of the Contest Committee of the Aeronautical Chamber of Commerce in charge of the meet:

CURTIS MARINE TROPHY RACE

PILOT	PLANE	TOTAL TIME	SPEED M.P.H.
Gorton, Navy.....	Navy TR-1	85:13.17	112.6
Elliott, Navy.....	Vought	88:18.38	108.7

SPECIAL PRIZE FOR GREATEST AIR SPEED

Sanderson, Navy.....	18 T	Greatest Air Speed 124.6 m.p.h.
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DETROIT AERIAL MAIL TROPHY

Nelson, Army.....	Martin Transport	2:27:20.72	105
Melville, Army.....	Martin Bomber	2:29:40.33	103.2
Cummings, Army.....	Martin Bomber	2:32:29.07	101.5

AVIATION COUNTRY CLUB OF DETROIT TROPHY

Harris, Army.....	Honeymoon Express	1:54:40.35	134.9
Jones, Curtiss.....	Curtiss Oriole	2:21:17.54	109.4
Worthington, Army.....	Fokker Transport	2:50:22.55	90.7

LIBERTY ENGINE BUILDERS TROPHY RACE

Koenig, Army.....	Lapere Observation	2:00:01.54	128.8
Bradley, Army.....	DH-4B Observation	2:02:14.21	126.5
Carter, Army.....	DH-4B Observation	2:10:50.62	118.1

PULITZER TROPHY RACE

Maughan, Army.....	Curtiss H.S.Pursuit	45:16.62	205.8
Maitland, Army.....	Curtiss H.S.Pursuit	45:52.34	198.8
Brow, Army.....	Curtiss Navy CR-2	48:07.19	193.8

GENERAL WILLIAM MITCHELL TROPHY RACE

Stace, Army.....	MB-3	50:25.73
Guidera, Army.....	MB-3	54:48.32
Broberg, Army.....	MB-3	55:07.87

ON-TO-DETROIT RACE

Beech	Laird Swallow
Jones	Curtiss Oriole
Stinson	JL Monoplane

video. There is one automobile for every 120 inhabitants, so that it is on a par with Argentina, but ahead of every other Latin-American country.

Also it has a higher percentage of cars than any European country, except Great Britain. The city of Montevideo with a population of fewer than 400,000 can show a higher proportion of cars than other large South American cities.

Montevideo used to be the paradise of medium priced cars, but during the past year there has been a distinct trend toward the low priced car, so much so that more than 60 per cent of the cars licensed every month correspond to the "less than \$800" class in the States.

As regards the immediate future, it must be borne in mind that the country still is in a precarious financial situation, but ever since the beginning of the year a steady improvement has been observed and it is safe to say that during the second half of the year, retail sales of automobiles will exceed 1200.

—BENJAMIN KOPT.

Duesenberg Argues Suit on Liberty Engine Work

WASHINGTON, Nov. 8—The Duesenberg Motors Corp. of Elizabeth, N. J., has argued its appeal before the United States Supreme Court on a claim for \$1,201,851, alleged to have been lost on a contract with the Government for the construction of Liberty engines during the war.

It is stated that in the early part of January, 1918, the Government entered into a contract with the company for the construction of 2000 Bugatti engines, which were to be a duplicate of the French models. A model furnished the company, it is said, proved of faulty construction, necessitating the construction of new designs. Eight engines were completed at the time of the armistice.

The company claims that because of the delay in furnishing the designs, it lost the amount it sues for. The lower court held that the profits claimed were "contemplated profits."

FINANCIAL NOTES

Allis-Chalmers Manufacturing Co. for the quarter ended Sept. 30 reports net profits of \$450,415 after Federal taxes, equivalent after preferred dividends to 62 cents a share earned on the \$25,770,750 common stock outstanding. In the preceding quarter net reached \$299,796, or at the rate of about 4 cents a share on the common and in the third quarter of 1921 was reported at \$421,365, or 51 cents a share. For the nine months, net profits aggregated \$1,028,944, equal to 63 cents a share on the common after preferred dividends, compared with \$1,831,435 or \$3.74 a share in the same period of the previous year. Unfilled orders on hand at the end of the quarter amounted to \$8,288,929, compared with \$9,110,514 on June 30 and \$7,260,574 on Sept. 30 last year.

Mullins Body Corp. reports for the nine months ended Sept. 30, last, sales of \$1,692,687 and a surplus after dividends of \$66,872. The statement in detail follows: Sales, \$1,692,687; allowances, \$76; net sales, \$1,692,611; cost of sales, \$1,436,831; gross profit, \$255,780; general expenses, etc., \$118,931; operating profit, \$136,849; interest and discount, etc., \$11,777; net profit, \$125,072; dividends, \$58,200, and surplus, \$66,872. The condensed balance sheet as of Sept. 30, last, shows cash amounting to \$270,474; trade accounts and notes receivable, \$372,052; merchandise inventories, \$432,364; accounts receivable, \$237,494; notes payable to banks, \$450,000; accounts payable and accrued, \$101,095; surplus, \$2,004,976, and total assets and liabilities, \$4,150,901.

Mack Trucks, Inc., reports net earnings of \$1,205,738, after charges for depreciation, maintenance and repairs, for the quarter ended Sept. 30, 1922. This is equal to \$3.25 a share on 283,108 shares of common stock. This is in marked contrast to the same quarter of 1921, when the company reported net profits of only \$12,633. For the nine months ended Sept. 30 net profits totaled \$2,766,564, equal to \$6.79 a share on the common. Total current assets as shown by the financial statement of Sept. 30 are \$22,052,844; liabilities, \$32,428,940. The company has no outstanding bank loans or funded indebtedness.

Johns-Manville Co. has called for retirement at \$120 a share and accrued dividend all of its outstanding preferred stock and will pay at some date in December a cash dividend of \$40 a share upon its common stock. A stockholders' meeting will be called to authorize conversion of the company's 25,000 shares of its outstanding common stock into 250,000 shares without par value at the rate of eight shares of new for each share of old, reserving 50,000 shares for sale to employees on favorable terms. No new financing is contemplated. Preferred stock will be retired between Dec. 15 and Jan. 1.

Timken Roller Bearing Co. reports earnings for the first nine months of the year of \$6,339,000 after depreciation and taxes. October's gross business exceeded September's and current operations are up to the October total. This would indicate not only a new high record for the last quarter, but total earnings after all depreciation charges and tax write-offs of around \$8,500,000 which is more than \$7 a share on the stock.

Willys-Overland Co. and subsidiaries for the quarter ended Sept. 30, 1922, show estimated earnings of \$4,099,675, from which a reserve of \$475,000 for the balance of price decrease was deducted, leaving a balance of \$3,624,675. Shipments for the last quarter were: Overland, model 4, 27,448; Willys-

Knight, model 20, 8277; Willys-Knight, model 27, 352; total, 36,077.

Hudson Motor Car Co. reports net earnings for the quarter ending Aug. 31 were \$3,656,218, or at the rate of \$3 a share on the outstanding stock of the company. Total profits for the quarter were \$4,183,327. Reserve for Federal taxes amounted to \$527,109. Dividends paid amounted to \$600,247, leaving a balance for surplus of \$3,055,971.

H. H. Franklin Manufacturing Co.'s regular quarterly dividend of 1 3/4 per cent on the cumulative 7 per cent preferred stock was paid on Nov. 1 to all stockholders of record on Oct. 20.

Moon Motor Car Co. for the quarter ended Sept. 30 reports net profits of \$326,478, equal after preferred dividends to \$2.08 a share on the 154,213 shares no par common stock.

Wolverine Truck Trailer Co. has decreased its capital stock from \$200,000 to \$12,000.

Durant Gets Gear Plant With Bid of \$2,100,000

SYRACUSE, Nov. 9.—William C. Durant, president of Durant Motors, Inc., has purchased the plant of the New Process Gear Co. in this city for \$2,100,000. The sale was confirmed by Federal Judge Cooper, who had previously rejected a bid of \$1,904,000, made by T. W. Warner of Toledo.

Judge Cooper expressed the belief that the price of \$2,100,000 is still inadequate and that the only reason it was accepted was because the sale would prove advantageous to the stockholders. Mayor George R. Lunn and Col. Francis G. Gaffy had approved the offer of \$1,904,000, which was made at the first sale.

When Judge Cooper refused to confirm the sale, the Durant corporation offered \$1,925,000, which Judge Cooper also rejected.

The New Process plant has been working at full capacity for many months, making gears for the Durant and Star cars. It is believed it will continue under the same management, for the present at least.

Peru May Lower Tariff Effective First of Year

WASHINGTON, Nov. 4—Lowered tariff duties into Peru on passenger cars, motor trucks, parts and tires are expected to be in effect by Jan. 17, according to a cablegram from Commercial Attaché Dunn, at Lima, to the Bureau of Foreign and Domestic Commerce. The final draft of the revised tariff law has been introduced into the Peruvian Senate, and the Government is urging action so that the law may be in force at the end of the year.

Motor trucks, now subject to an import duty of .20 soles per kilogram of weight, will be reduced to .03 soles per kilo, as a special concession to foster their use, and passenger cars, now taxed at .60 soles per kilo, with additional special surtaxes, will be changed to an ad valorem tariff of 15 per cent. Truck tires will be changed from 1.60 soles per kilo to .50 soles, tires for passenger automobiles from 1.60 per kilo to 1.00, and solid tires from 1.60 to .05 per kilo.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Last week rates for call loans ranged between 4 1/2 per cent and 6 per cent, as compared with 4 per cent to 6 per cent in the preceding week. The increased firmness was attributed to the increased demand for funds to meet end-of-the-month requirements, to a considerable calling of loans during the early part of the week, and to the continued flow of funds to the interior to satisfy crop-moving demands. Increased firmness also developed in the time money market. The rate for 60 days' to 6 months' maturities was 4 3/4 per cent to 5 per cent, as compared with 4 1/2 per cent to 4 3/4 per cent for the shorter maturities the preceding week. The prime commercial rate was 4 1/2 per cent, as compared with 4 1/4 per cent to 4 1/2 per cent.

The volume of business for the week ending Nov. 2, as indicated by bank clearings at the leading cities of the United States, totaled \$7,794,359,000, which was a gain of 1.4 per cent over the preceding week and 10.3 per cent over the corresponding week of last year. New York City alone showed a gain of 9.2 per cent over 1921.

Another favorable factor was to be found in the car loadings for the week ending Oct. 21, which totaled 1,003,759 cars, the largest amount in two years, and only 14,780 cars below the loadings for the week ending Oct. 14, 1920, which constituted the peak in the history of American railroads. Total loadings of merchandise and miscellaneous freight, 596,392 cars, were the largest ever recorded.

Of a more adverse nature is the report of railroad earnings for September. The net operating income of Class I railroads for the month amounted to \$58,428,000, which indicates a yearly return of only 2.88 per cent on the tentative valuation. This compares with \$87,534,000 for September.

Comet Assets, \$461,000; Plant Will Remain Closed

DECATUR, ILL., Nov. 8—Assets of the Comet Automobile Co. of this city, as given recently by John W. Evans, master in chancery, in his report to the Circuit Court, in the case of that company against the Farmers State Bank & Trust Co., amount to \$461,000; and the total ascertained liabilities, other than the \$250,000 of bonds held as collateral security by the bank, are considered to be less than half the value of the assets.

The future of the company is uncertain. The receivers will make no effort to operate the plant. They are now taking an inventory. The parts department is open in order that owners of Comet cars can purchase spare or extra parts if they require them. The receivers will probably also order the completion of a number of cars.

Petroleum Meeting Attracts Engineers

Members of S. A. E. Will Take
Part in Some Sessions at
Meeting of A. P. I.

NEW YORK, Nov. 3—Some details of the program for the annual meeting of the American Petroleum Institute, to be held in St. Louis December 5 to 8, have been announced. Certain of the sessions will be, in effect, joint sessions in which members of the Society of Automotive Engineers will take a prominent part, while all members of the S. A. E. are invited.

The general sessions of the A. P. I. meeting will not open until the afternoon of Dec. 6, but on Dec. 5 there will be meetings of the Association of Natural Gasoline Manufacturers at which the use of natural gasoline in motor fuel will be discussed; and of Committee D-2 of the American Society for Testing Materials, at which standard methods for testing petroleum products will be considered.

Outline of Program

The so-called group sessions of particular interest to the automotive industry will begin at 10:30 a.m. Thursday, Dec. 7, at which time papers on the subject "What Constitutes Good Gasoline?" will be read. One of these, by Dr. S. W. Stratton of the Bureau of Standards, is entitled "The Answer so Far Given by the General Research Program of the Bureau of Standards, the Oil and Automotive Industries." A "Demonstration of the Relationship of the Knock to the Gasoline Problem—the Remedy for the Knock" will be given by Thomas Midgely, Jr., of the General Motors Research Corp. There will follow discussions by B. B. Bachman, O. C. Berry, R. C. Clarkson, C. F. Clarkson, H. R. Cobleigh, H. M. Crane, H. C. Dickinson, H. L. Horning, F. A. Howard, W. S. James, T. J. Little, Van H. Manning and others.

A second session of automotive interest will be that to be held at 10:30 a.m. Friday, Dec. 8, and devoted to a discussion of the present status and probable development of the internal combustion engine to consume heavy fuels. Henry L. Doherty is scheduled to present the chief paper. This is to be followed by discussion by various engineers concerned in the development of heavy fuel engines of automotive and other types.

To Take Part in Revisions

NEW YORK, Nov. 7—The Interdepartmental Committee on Petroleum Specifications, a Government committee charged with formulating specifications for gasoline, lubricating oils and other petroleum products, is to hold an open joint meeting with committees of the Society of Automotive Engineers and the American Petroleum Institute in the auditorium of the Interior Building, Washington, at 10 a. m., Nov. 13.

At that time certain revisions in the present Government specifications for gasoline and lubricating oils will be considered, as will also the recommended standards for lubricants formulated by Lubricants Division of the S. A. E. Standards Committee.

INDUSTRIAL NOTES

Moore Drop Forging Co., automobile parts manufacturer, has awarded a contract for a machine shop at its Chicopee plant. Its dimensions will be 93 x 35, and it will be ready for operation by the end of the year. November production is said to be running about even with October, which represented the high mark for the year, and prospects for the rest of the year are good.

Norwalk Iron Works Co., builder of compressors, manufacturing air and gas compressors for all purposes and also refrigerating machinery, with general offices and works at South Norwalk, Conn., has opened a Chicago office at 627 West Washington Boulevard. It is in charge of L. R. Bremser, who for 13 years was associated with Gardner Governor Co.

Herberts Machinery & Supply Co., Los Angeles, Cal., has been appointed representative by the Diamant Tool & Manufacturing Co., Inc., of Newark, N. J., in connection with the sale of Diamant standard punch and die sets, in the territory covered by the entire States of California, Arizona and Nevada.

Black & Decker Manufacturing Co.'s Philadelphia branch office and service station, formerly located at 318 North Broad Street, has re-located, the new address being 824 North Broad Street.

Few Changes in Chassis of New Locomobile Model

BRIDGEPORT, CONN., Nov. 8—A new model Locomobile to be known as the Series 8 is now ready for production. The chassis remains practically the same as before, the improvements being in the nature of refinements rather than radical departures from Locomobile traditions.

The changes include the use of a Delco battery ignition system of the two spark type with two independent units, each with its own coil, breaker and distributor; a new type clutch, a new arrangement of timing gears and a redesigned camshaft with cams ground to reduce noise to a minimum.

The springs are more resilient, and the manifolding is hot water jacketed. The bodies show no changes and the prices remain the same as before, ranging from \$7,600 for the phaeton to \$11,000 for the sedan. The chassis price is \$6,800.

NEW LYCOMING ENGINE

WILLIAMSPORT, PA., Nov. 8—With the perfection of a new engine, the Lycoming Motors Corp. has announced that its force of 700 men will be gradually increased, until an output of 125 engines a day has been reached.

METAL MARKETS

To all appearances the transformation of the iron and steel markets from their recent condition of producers' supremacy into one of mastery over values by consumers has been completed. Sellers are far more anxious for orders than buyers are to place them. In these circumstances it is all the more astonishing to encounter predictions of early price advances by the leading interest. These prophecies have it that "finished steel products are expected to remain stabilized at present levels, except some specialties, and these are expected to go up, not down." Named among the latter are certain grades of forgings.

This forecast, which was disseminated via Wall Street a few days ago, concluded: "It is also said sheets may be advanced by the corporation in the near future." No more convincing evidence of the change that has come over the sheet market could be adduced. Its only hope lies in the more than remote possibility of price advances by the chief interest. As a rule early upward changes in the Corporation's prices are predicated on positive factors, such as excess of the demand over the supply or marked increases in costs of production, and not on an altruistic desire to make it easier for the independents to replenish their backlog of orders.

In fact, sheet interests heretofore enthusiastically bullish in their sentiments have changed their tone in the last few days and admit that the slowing up in the demand is becoming pronounced. The full-finished sheet market is in somewhat better shape than that for ordinary grades, but even here a change in the tone is noticeable. The fact that many of the rollers of full-finished automobile sheets have orders on their books that will carry them through the remainder of the year is not so much of a solace as it would seem at first glance. The end of the year is only seven weeks distant and what with the holidays that intervene, the backlog of orders necessary to keep mills running to the end of the year need not be much in excess of a normal month's business.

It is generally admitted that the steel market in the course of the next few weeks faces another period of readjustment. There have been periods in the steel market when lack of buying appetite was relieved by a drastic resort to higher prices. Those who make the steel industry's price policies know, however, the grave risk incurred in revising values upward unless there is reasonable assurance that developments will vindicate such a move.

Pig Iron.—Prices are melting. Representative transactions between blast furnace interests and automotive foundries are lacking, but even in carlot sales buyers are usually able to cut under published quotations.

Aluminum.—Important aluminum consumers in the automotive industries are reported to have covered considerable of their wants for the first half of next year. Several millions of imported metal are said to have been contracted for in the last few weeks. The domestic producer is reported to be averse to commitments beyond the current quarter and importers have been booking considerable business for 1923 deliveries. Shipments of British and Swiss metal continue to arrive and so far as ingots are concerned the higher tariff appears to have made little inroads on the business of importers.

Copper.—Producers of wrought copper and brass products explain advances in prices by pointing to the rise in virgin metals and the draining of the supply of war scrap.

Calendar

SHOWS

- Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.
- Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.
- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 8-13—New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.
- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.
- Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

- Nov. 3-11—London (Olympia), Automobile Show.
- Nov. 9-19—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.
- Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.
- Dec. 15-Jan. 2—Paris, Aeronautical Salon, Grand Palace, Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.
- Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquanteaire.
- May-July, 1923—Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

- Oct. 26-28—Washington, Second National Conference for

the Study of Highway Engineering and Highway Transport Education.

- Nov. 14-15—Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, La Salle Hotel.
- Dec. 6-8—St. Louis, Third Annual Meeting of the American Petroleum Institute, Hotel Statler.
- Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.
- Jan. 29-31—Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

- Nov. 16—Speaker, A. L. McNulty, Consulting Engineer, Connecticut State Motor Vehicle Commission; Subject, Regulations

Governing the Use of Rural Highways.

- Dec. 14—Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.
- March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.
- April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.
- May 17—Speaker, F. P. Gilligan, Secretary, Henry Southern Engineering Co.; Subject, Metallic Materials for Automotive Work.
- Other Meetings**
- Jan. 9-12—New York, Annual Meeting.
- Jan. 31—Chicago Meeting and Dinner of the Society at the Congress Hotel.

Industry Increases Number Men at Work

WASHINGTON, Nov. 8—Increased employment in the automotive industry has been noted by the United States Employment Service in its industrial analysis for the month ending Oct. 31. Under the industrial classification of "vehicles for land transportation" the industry which sustained a decrease last month of 16,232 shows an increase in October of 8297 employees.

In the industrial survey for Michigan, the Department of Labor says that the state reports a favorable outlook in the automobile, metal, textile, and iron industries, with an unusually promising outlook for the steel industry.

There is a shortage of skilled workers in the automotive industry at Flint and an automobile body plant is under construction in that city, which will ultimately employ 12,000 workers.

In Illinois, particularly in the Chicago industrial district, automotive plants are holding their high rate of production. In Indiana there is a shortage of workers in all industries, especially tool and die makers and automobile mechanics. Many Indianapolis factories are working overtime.

Conditions in Cleveland

CLEVELAND, Nov. 7—Employment in Cleveland increased during October, although the number on the rolls of automobile and accessory establishments decreased 5.9 per cent, according to a survey of the Cleveland Chamber of Commerce.

In the last month two companies, Templar and Grant, went into the hands of receivers, as protective measures, and both plants were shut down for invoice. Orders were not interfered with or shipments delayed.

Iron and steel mills and fabricating plants, which are the backbone of Cleve-

land's industry showed an increase of 5.9 per cent in the number of employees.

Servicemen and Dealers Hear Oil Pumping Talks

NEW YORK, Nov. 6—Oil pumping was discussed at a meeting of the Automotive Service Association of New York at the Automobile Club of America, which was attended by 80 service managers and dealers. The principal speakers were A. Ludlow Clayden of the Sun Oil Co. of Philadelphia, H. E. Pengilly of the Standard Oil Co. of New York and George A. Round of the Vacuum Oil Co.

Discussing the pressure type of lubrication, Clayden told his audience that oil pumping troubles usually occur as wearing takes place in the bearings, being followed by an apparent drop in oil pressure. A remedy is to cut the supply of oil still further by opening the by-pass, said Clayden.

Round, talking on splash lubrication, claimed that faulty design of the connecting rod dippers and incorrect oil levels in the troughs often cause trouble, while Pengilly urged the service managers to make a special campaign to educate owners to change oil regularly.

Pengilly condemned the practice of flushing out the crankcase with kerosene and told of a new flushing oil which, he claims, has all the advantages of kerosene without its detriments.

Another meeting will be held at the A. C. A. Dec. 1 at which the subject will be: "Modern Production Methods, with Particular Attention to Hand Operations."

FRANKLIN OVERSOLD

SYRACUSE, Nov. 5—The Franklin Automobile Co. reports that the number of unfilled orders now on hand is equivalent to all of November production and one-third of December production as well.

Increase in Exports Reported by Canada

WASHINGTON, Nov. 4—The exports of automotive equipment from Canada during September reached a total value of \$2,038,030, an increase of 14 per cent over the previous month. This announcement from the Automotive Division of the Bureau of Foreign and Domestic Commerce also showed that the outgoing passenger cars from Canada totaled 2943, valued at \$1,718,931, and trucks 274 with a value of \$131,473. No month of this year has shown such a heavy shipment of trucks, and in only one were the passenger car shipments lower, that month being March, when 2983 vehicles were exported. The value of the parts exported during September was \$188,399.

Foreign shipment of 5862 passenger cars and 1295 motor trucks from the United States during September had previously been announced here. Thus the total export movement from the two countries consisted of 8805 passenger cars and 1569 motor trucks. All records for truck shipments during the present upswing of sales, therefore, were broken. The September exports of cars were exceeded only in August and June of this year.

MOON'S OCTOBER SALES

ST. LOUIS, Nov. 7—The Moon Motor Car Co. reports that its sales last month were 390 per cent greater than sales for October of last year, and were 70 per cent of the sales for last August, which was the largest month in the company's history. The dropping off of business in some sections of the country has been compensated for to a large extent by an increase in other sections, notably in Texas and California. The November production schedule calls for the same output as in October.